AVIATION AND AIRCRAFT JOURNAL

DECEMBER 12, 1921 VOL. XI. NO. 24

Member of the Audit Bureau of Circulations

INDEX TO CONTENTS

Editorials	677	New Speed Records	684
Distribution of Load over Wing Tips and Stress Analysis	678	Tests of the 450 hp. Bristol Jupiter Engine	685
The Question of Tandem Propellers	679	Control in Circling Flight	686
French Air Transport Leads	680	Minimum Induced Drag of Aerofoils	686
Flying Field at Honolulu Park	680	An Enthusiastic Aerial Passenger	686
Sport Farman at Baltimore	680	"Who's Who in American Aeronautics"	687
The Chamberlin-Standard H5 Five-Seater	681	The Safety of American Civil Aviation	689
Canadian Airharbors	681	Air Service Develops Radio Controlled Automobile	690
Photographic Forest Survey	681	Resumption of Air Service Recruiting	690
Parachutes and Life Packs	682	Course for Enlisted Men at Communications School	690
Chicago—New York Non-Stop with Five on Board	682	Second Prague Aero Show	690
Semirigid versus Nonrigid Airships	683	Foreign Aeronautical News	691
Lectures on Commercial Aviation	684		

THE GARDNER, MOFFAT COMPANY, Inc., *Publishers*

HIGHLAND, N. Y.

225 FOURTH AVENUE, NEW YORK

SUBSCRIPTION PRICE: FOUR DOLLARS PER YEAR. SINGLE COPIES FIFTEEN CENTS. CANADA, FIVE DOLLARS. FOREIGN, SIX DOLLARS A YEAR.

COPYRIGHT 1921, BY THE GARDNER, MOFFAT COMPANY, INC.
ISSUED EVERY MONDAY. FORMS CLOSE TEN DAYS PREVIOUSLY. ENTERED AS SECOND-CLASS MATTER NOV. 22, 1920, AT THE POST OFFICE AT HIGHLAND, N. Y., UNDER ACT OF MARCH 3, 1897.

THOMAS-MORSE AIRCRAFT CORPORATION

Thomas-Morse Training 2-Seater in flight over Ithaca, N. Y.

THOMAS-MORSE AIRCRAFT CORPORATION

24,948 Parts

make a Martin Bomber

SPECIALIZED production methods are necessary to insure absolute accuracy and uniformity in each part which goes to the making of a Glenn L. Martin Bomber.

There are 18 separate bulkheads. Each bulkhead is assembled on a machined steel surface plate with location blocks with an accuracy impossible by any other method. The rigid inspection will not permit variations greater than 1-100 of an inch on these bulkheads.

The 24,948 parts which go to make a completed bomber are assembled with ease and rapidity. Every part fits into its place just as its designer had planned.

It is the combination of advanced engineering with such methods of manufacture that enables the Glenn L. Martin Bomber to set unsurpassed records for safety, endurance, performance and dependability.

MARTIN U.S.A.

TRADE-MARK

THE GLENN L. MARTIN CO.

CLEVELAND

Member of the Manufacturers Aircraft Association

MARTIN U.S.A.

TRADE-MARK

L. D. GARDNER
PRESIDENT
W. D. MOFFAT
VICE-PRESIDENT
W. I. SEAMAN
TREASURER
GEORGE NEWBOLD
BUSINESS MANAGER

AVIATION AND AIRCRAFT JOURNAL

LADISLAS D'ORCY
EDITOR
ALEXANDER KLEMIN
EDWARD P. WARNER
RALPH H. UPSON
CONTRIBUTING EDITORS

Vol. XI December 12, 1921 No. 24

The Annual Air Service Report

THE annual report of the Chief of Air Service as a separate document has been dispensed with by the War Department in the interests of economy. Excerpts will appear in the report of the Secretary of War, but no copies of the Air Service report will be available except as the Chief of Air Service cares to show the original in his office.

In a year when the Air Service has achieved certain results which have received international attention, and when aviation problems have become almost as important in themselves as those of the Army and the Navy considered separately, the public is not to be given the opportunity of reading the official records of such progress.

Economy in government printing is, as usual, starting at the point where the least economy will be secured. The amount of useless printing caused to be done by other departments of the government indicates that the pruning knife could be applied at less important objects than the report of the Chief of Air Service.

In view of the general interest the annual report of the Chief of Air Service has heretofore elicited from the aeronautical world it is to be hoped that AVIATION AND AIRCRAFT JOURNAL may be authorized to give at least a portion of this report the widest possible publicity.

Tests with Tandem Propellers

THE article dealing with the question of tandem propellers which appears in this issue makes interesting reading, particularly in connection with the Paris Aero Show, at which several airplanes fitted with tandem propellers were exhibited. Our next issue will contain a comprehensive illustrated report on this show, and our readers will be able to see for themselves how French aircraft constructors have gone about bringing the question of tandem propellers to the fore.

Without any attempt to discuss the efficiency of tandem propellers, it does appear however that the pusher in a tandem combination is not by any means as inefficient as was assumed before systematic tests were made. The principal advantage of a tandem propeller arrangement is of course that it permits of doing away with a lot of parasite resistance in the shape of separate engine nacelles. In addition through the use of tandem propellers a large increase in power can be applied in the center line (on flying boats, for instance) with the same engines which otherwise would require an outboard mounting. This has a decided advantage from the viewpoint of piloting, for twin-engined machines are not, as a rule, very easy to fly on one engine for any length of time.

As against these advantages of the tandem propeller arrangement, there is the drawback that where they are used in twin sets the defects of outboard engines not only occur again, but they are even likely to be magnified, as in the case of an entire tandem set being placed out of commission through engine trouble. How such an airplane would fly on one outboard tandem set remains to be seen, and tests regarding such an eventuality should be of considerable interest.

That some of the French aeronautical engineers are rather doubtful about twin tandem propellers affording the best solution of the multi-engine problem seems to be borne out by the comparatively large number of three-engined machines seen at the show. It is obvious that three-engined airplanes are less delicate to pilot with one engine stopped than twin-engined machines, first, because such a stoppage eliminates only one-third of the available power as against one-half, and second, because the turning moment is for the same reason much smaller. The main drawback of a three-engined combination is that it does not afford the pilot and navigator such an unobstructed field of vision as the twin-engined machines.

The Location of Air Terminals

THE cover illustration of this issue, which shows one of the Paris railroad terminals as seen from the air, may not strike the reader as having any particular connection with aviation save that it is a fine aerial photogragh. However, on further reflection, the picture may assume an entirely different aspect.

Railroad terminals are, as a rule located in the heart of cities so that travelers may reach them with the least possible loss in time. If we compare this fortunate situation of theirs with air terminals, we are struck by the great distance which separates municipal and other airdromes from the city which they are supposed to serve. As a consequence the aerial traveler who may save half of his time by traveling in aircraft between two cities is likely to lose again a not immaterial amount of the time saved owing to the great distance which separates the airdrome from the city, and also because of the lack of rapid communications at such terminals.

While this question is not yet an urgent one in New York, for instance, owing to the inexistence of regular air lines, it will sooner or later assume considerable importance. Amphibians are, we believe, unlikely to afford a completely satisfactory solution of the question, because of the necessarily less efficient nature of such machines. Hence, while the Hudson may be an ideal airharbor for flying boats and amphibians engaged in coastal and river traffic, it cannot be gainsaid that the big overland air lines which some day will come into existence will require a land airdrome, possibly with a water front, to permit of the alighting of land and water machines at the same terminal. That such a terminal should have the best possible central location is obvious, and the question therefore deserves of exhaustive study.

Distribution of Load over Wing Tips and Stress Analysis

By B. V. Korvin-Kroukovsky, M.Sc.

Aeromarine Plane and Motor Co.

It is a well known fact, that load per inch run of a wing drops off in proximity of wing tip. The necessity of taking this drop into account in strength computations was recognized long ago, and several approximate methods were in use. Study of pressure distribution along model wings was made by the National Physical Laboratory, and led to the conclusion, that distribution of the load over a wing tip is practically independent of the plan form of the tip. Accordingly a mean curve was deduced, which was standardized by Technical Department in England, as the basis for strength computations. This load curve is reproduced on Fig. 2.

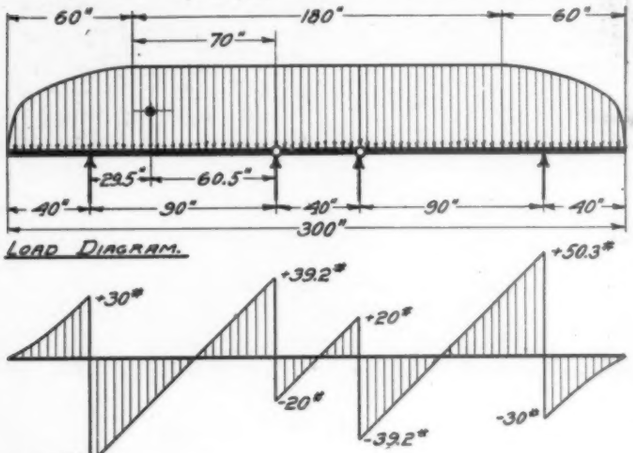


FIG. 1.

Computation of the effect of such a load distribution in each individual case would involve, however, considerable difficulties, and would require large amount of time, which fact is probably responsible for little popularity being gained by this method.

However, if curves of shear force and bending moment were drawn, and were expressed in terms of chord length and loading per inch run, computations would become very simple and short, as it will be shown in the example below.

Let Fig. 1 represent the distribution of load along upper wing of biplane, chord of which is 50 in. long, and let it be previously found, that total load carried by the wing is 900 lb. It is required to find the load per inch run, which we shall designate by X.

The load on each wing tip is variable over a length of 1.2 times the chord, i.e. over the length of 60 in. From the curve of shear force on Fig. 2 we find, that at 1.2 chord from the wing tip shear force is equal to .99 $\times$ chord $\times$ load per inch run. Hence load carried by each wing tip is:

$$0.99 \times 50 \times X = 49.5X \text{ lb.}$$

Load carried by the middle part of the wing is evidently:

$$180 \times X = 180X \text{ lb.}$$

Total load:

$$900 = 180X + 2 \times 49.5X = 279X$$

or $$X = 900/279 = 3.23 \text{ lb. per inch run}$$

Bending moments and reactions of supports can be found most conveniently in terms of load of 1 lb. per inch run. Actual reactions and moments for any one condition are readily found then by multiplying results by load per inch run and by proper load factor.

Upper sketch of Fig. 1 shows, that outer strut is located 40 in., or 0.8 chord from the wing tip. Consulting the curve on Fig. 2, we find that at this distance bending moment is equal to 0.215 $\times$ Chord^2 $\times$ Load per inch run. Hence bending moment due to overhang is:

$$0.215 \times 50^2 \times 1 = 537 \text{ in.-lb.}$$

In order to find the reactions of supports, it is necessary to find first the center of gravity of the load diagram. This

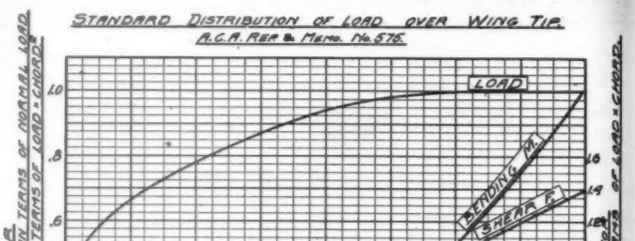

STANDARD DISTRIBUTION OF LOAD OVER WING TIP
A.C.A. REP. & MEMO. No. 575.
SCALE FOR LOAD PER INCH RUN IN TERMS OF NORMAL LOAD.
BENDING MOMENT IN TERMS OF LOAD × CHORD.
LOAD
BENDING M.
SHEAR F.
SCALE FOR SHEAR FORCE IN TERMS OF LOAD × CHORD.
DISTANCE FROM WING TIP IN TERMS OF CHORD.

FIG. 2.

is accomplished best by taking moments about point 60 in. from the wing tip (1.2 chord):

Moment due to uniform load $= 70^2/2 =$ 2450 in.-lb.
Moment due to tip load $= 0.525 \times 50^2 =$ —1330 in.-lb.

Net moment = 1120 in.-lb.

Total load on the panel:
$0.99 \times 50 + 70 = 119.5$ lb.

Position of C.G. $= 1120/119.5 = 9.5$ in. toward the center line of the wing (see Fig. 1).

Then we find:
Reaction at the strut $= 119.5 \times 60.5/90 = 80.3$ lb.
Reaction at the hinge $= 119.5 \times 29.5/90 = 39.2$ lb.

As computations were made for the load of 1 lb. per inch run. shear is evidently equal to zero at the distance of 39.2 in. from the hinge. Max. bending moment occurs at the same place and is equal to $39.2^2/2 = 768$ *in.-lb.*

Max. bending moment in the center panel is evidently:

$$40^2/8 = 200 \text{ in.-lb.}$$

With above information on hand, diagram of shear forces and of bending moments can be readily drawn, giving bending moment in any section desired.

It may be concluded from the above example, that with the curves of shear force and bending moment supplementing the load distribution curve, computations are neither longer, nor more difficult than in case of different approximate methods now in use, and have the advantage of being founded on actual test data.

The Question of Tandem Propellers

By A. Lapresle

Director of the Eiffel Laboratory

DFW Giant (Four 260 Hp. Mercedes) with Four Shaft Driven Propellers

The question of tandem propellers has not yet been approached from the theoretical viewpoint, and considerable incertitude existed with regard to their functioning until, in 1919, M. Eiffel began a series of systematic experiments.

While the National Physical Laboratory of Teddington, England, conducted an investigation of tandem propellers for the Handley-Page company, the experiments were too few in number to be considered systematic. These experiments however demonstrated the fact, later verified by M. Eiffel, that in a tandem propeller arrangement the two propellers must turn in opposite directions if the rear propeller is to have a satisfactory efficiency.

On airplanes tandem propellers are, as a rule, driven by two identical engines. It is therefore necessary that both propellers absorb the same amount of power, from which it follows that the object of tests on a tandem propeller arrangement may be stated in the following terms:

Given a tractor propeller, there is required a pusher propeller which, while influenced by the tractor, will absorb the same amount of power as the latter.

The most simple means for equalizing the power of tractor and pusher in a tandem combination is to use a pusher embodying variable pitch, which will make it absorb the same amount of power as the tractor.

In the case of tandem propellers driven by identical engines, and turning in opposite directions, M. Eiffel has determined the following two points:

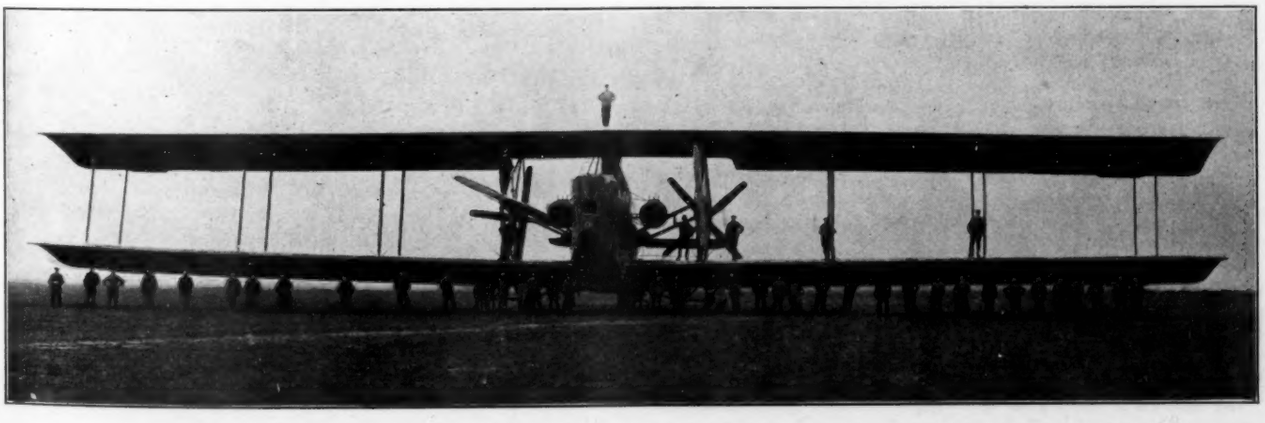
There is no advantage from the viewpoint of efficiency to give the pusher a pitch which would require the use of front and rear propellers of different diameters.

There is no advantage from the viewpoint of efficiency to give the pusher a pitch which would make it necessary to turn two propellers of the same diameter at different speeds.

These conclusions have led M. Eiffel to investigate the case of tandem propellers having the same diameter, and turning at the same speed in opposite directions. The tests made with such a combination show that the pitch required by the pusher is, in general, about the same as that of the tractor when the latter turns at a speed corresponding to maximum efficiency. The tractor, on the other hand, is but little influenced by the rotation of the pusher.

In following up this investigation M. Eiffel has made a series of tests with tandem propellers between which a fuselage with its center section elements (cells) was mounted. These obstacles to the air flow modify but slightly the pitch which is required for the pusher, as may be seen from Table I.

*Translated by L. d'Orcy from L'Aerophile.



Siemens-Schuckert Giant (Six 300 Hp. Basse-Selve) on which the Tractors were Driven by one Engine each, while the Pushers were Coupled to two Engines each. All Propellers were Gear Driven

TABLE I. PITCH REQUIRED BY PUSHER IN A TWO-BLADED TANDEM COMBINATION

Relative pitch of tractor	0.4	0.6	0.8	1.0
No fuselage between tractor and pusher	0.44	0.64	0.82	0.98
Fuselage between tractor and pusher	0.44	0.63	0.80	0.98
Fuselage and wing cell between tractor and pusher	0.43	0.62	0.78	0.97

The influence of the tractor on the pusher causes a certain decrease in efficiency of the latter. This decrease is on the average 12 per cent, 3 per cent, and 1 per cent, when the pitch of the tractor is 0.6, 0.8, and 1.0 with respect to the pusher. From this it appears that the pusher is the more efficient the higher the pitch of the tractor.

As tandem propeller arrangements are chiefly used on large and comparatively slow airplanes, it is likely that the propellers having a large pitch would be geared down. If the

TANDEM PROPELLER ARRANGEMENT ON THE SAVOIA S22 FLYING BOAT

designer decides that, despite the drawbacks of such an arrangement (increase in the dead weight of the power plant, dissipation of energy due to friction) geared propellers are desirable, he should establish the gearing down in such a way as to give the tractors the largest possible relative pitch in order to make the pushers the more efficient.

M. Eiffel has found that the presence of a fuselage and of wings between tandem propellers materially *increased* the efficiency of the pusher, but he also noted that this increase was accompanied by a notable increase in the head resistance of the fuselage. Therefore, until further experiments will have cleared up this delicate question, it will be best not to count upon this apparent increase in the efficiency of the pusher through the agency of the fuselage.

It may be worth while in certain cases to use a tandem arrangement comprising two-bladed tractors and four-bladed pushers, like the combination used on the four-engined Handley-Page bomber. Such an arrangement has the advantage of preventing, through the creation of two pulsations of different periods, the phenomens of *resonance*, which, as is well known lead to vibrations of dangerous amplitude.

As the propellers turn as a rule at the same speed, it is necessary to equalize the power absorbed by the two-bladed tractor and by the four-bladed pusher by giving the latter a smaller diameter.

M. Eiffel investigated the combination of a two-bladed tractor of 80 cm. (2 ft. 7.5 in.) diameter, and of a four bladed pusher of 70 cm. (2 ft. 3.5 in. diameter, both turning at the same number of revolutions. The pitch required by the pusher in order to make it absorb the same amount of power as the tractor are given in Table II.

The efficiency of such a four-bladed pusher turning in the slip-stream of a two-bladed tractor varies approximately in the same proportion as that given above for two-bladed pushers.

TABLE II. PITCH REQUIRED BY A FOUR-BLADED PUSHER OF 2 FT. 3.5 IN. DIAMETER WHEN COMBINED IN TANDEM WITH A TWO-BLADED TRACTOR OF 2 FT. 7.5 IN. DIAMETER

Relative pitch of tractor	0.6	0.8	1.12
Pitch required by pusher aft of fuselage	0.78	0.95	1.12
Pitch required by pusher aft of fuselage and wings	0.72	0.89	1.08

French Air Transport Leads

The following tabulation of the activities of French and other foreign commercial air services during the month of September, 1921, has been received from Capt. de Lavergne, French air attaché in Washington, D. C.

PERFORMANCE OF FRENCH AIR LINES, SEPTEMBER, 1921

	Trips Completed.	Passengers	Freight (Kg.)	Mail
PARIS-LONDON.				
Compagnie des Grands Express Aeriens	50	253	3.547	24
Compagnie des Messageries Aeriennes	114	187	5.072	101
PARIS-AMSTERDAM.				
Compagnie des Messageries Aeriennes	30	101	1.279	49
PARIS-BRUSSELS-AMSTERDAM.				
Societe Generale des Transports Aeriens	25	72	1.038	2
PARIS-STRASBOURG, PRAGUEN-WARSAW.				
Compagnie Franco-Roumaine	188	229	6,237	322
TOULOUSE-BARCELONA-MALAGA-CASABLANCA.				
Compagnie Generale d'Entreprises Aeronautiques	165	59	1.336	679
BAYONNE-BILBAO-SANTANDER.				
Compagnie Franco-Bilbaine	36	87	.....	...
BORDEAUX-TOULOUSE-MONTPELLIER.				
Aero Transports Ernoul	104	116	.....	...
TOTAL	712	1.104	18.509	1.177

PERFORMANCE OF OTHER FOREIGN AIR LINES IN THE CORRESPONDING PERIOD

BELGIUM.				
Brussels-London (Societe Nationale pour l'Etude des Transports Aeriens)	55	71	.....	...
GREAT BRITAIN.				
Paris-London (Instone Air Line)	50	273	.....	...
(Handley-Page)	48	309	.....	...
NETHERLANDS.				
Amsterdam-London (Koniglijke Luchtvaart Maatschappij)	46	55	.....	...
Rotterdam-Amsterdam-Hambourg (From August 28 to Sept. 24)	45	33	.....	...
SWEDEN.				
Stockholm-Reval (Svenska Lufttrafikaktiebolaget) Porjus-Suorva (in August)	32	34	1.159	...

The comparison between the performance of the French and other foreign air lines is highly instructive, and shows the remarkable development civil air transport has assumed under the able guidance of the French air department.

Flying Field at Honolulu Park

In a previous issue of AVIATION mention was made of the fact that there was a possibility that Honolulu may have a municipal flying field in the near future if arrangements can be effected whereby Honolulu Park may be extended to embrace a sufficient area for taking off and landing of airplanes.

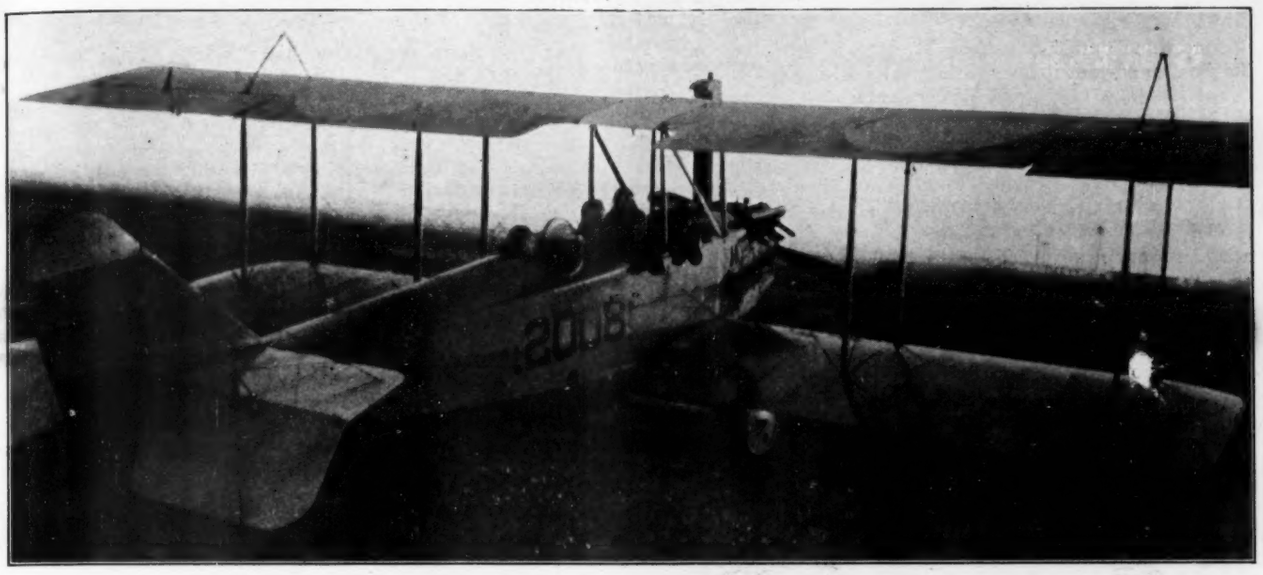
Our attention has been called to the fact that there is no municipal flying field at Honolulu, and that Honolulu Park is located at Hilo, some 210 miles from Honolulu. According to latest information obtainable, the matter of the construction of a landing field at Honolulu Park has been placed before the Board of Supervisors of the County of Hawaii at their regular monthly session, and it is urged that the supervisors proceed as soon as practicable to prepare a firm and level strip of land, 600 yd. long by 200 yd. wide in the direction of the prevailing wind. Funds required for the construction and upkeep of this landing field will, in the event the project is approved, be appropriated from the general funds of the County of Hawaii.

Sport-Farman in Baltimore

The Sport-Farman two-seater, which has appeared so successfully at the New York, Kansas City and Omaha meetings, astonishing the audience with its spectacular performance, participated in the Second Exhibit of Aircraft of the American Flying Club of Baltimore held in that city on Dec. 3 and 4.

W. Wallace Kellett, representing the Farman Co., and Pilot D. H. Robertson flew to Baltimore from Philadelphia. Demonstrations of the Sport-Farman are to be given at Washington and several other southern cities, where interest is keen in the performance of this little machine.

The Chamberlin-Standard H5 Five-Seater



CHAMBERLIN-STANDARD MODEL H5 COMMERCIAL FIVE-SEATER (150—180 HP. HISPANO-SUIZA)

Among the numerous conversions for commercial uses to which the Standard J1 training airplane has lent itself one of the most interesting is the Chamberlin-Standard five-seater produced by Chamberlin Aircraft, with headquarters at Hasbrouck Heights, N. J. This firm maintains for purposes of joy riding, aerial photography and flying instruction a fleet of sixteen biplanes, mostly DH6's and Standards. A few Bellanca monoplanes and biplanes are also included in their equipment, and a Curtiss MF flying boat is soon to be added to it. The latter will be rebuilt to carry four passengers beside pilot by the fitting of new wings and of a 180 hp. Hispano-Suiza or a 170 hp. Isotta-Fraschini engine.

The activities of the firm are conducted by Pilots C. D. Chamberlin, Davis and Stroop, all of whom possess a long experience in flying and in airplane maintenance. The airdrome at Hasbrouck Heights, which is only 6 miles from Times Square, New York, is ideally located for civil flying as it affords landing facilities to both land and water machines.

The Chamberlin-Standard to which reference is made above, and which is known as model H5, is fittted with the Hispano-Suiza engine which develops 150 hp. at 1450 r.p.m., and 170 hp. at 1650 r.p.m. The total wing area is 429 sq. ft. and the weight empty 1650 lb. Carrying 25 gal. of gasoline, sufficient for 2 hr. flight slightly throttled, and five persons, the weight loaded is 2575 lb. This gives a wing loading of 6 lb./sq. ft., and power loading of 15.1 lb./hp. The fuel is carried in a 15-gal. center section tank and in a 10-gal. pressure tank mounted in the front cockpit. With this load the machine has a high speed of 95 m.p.h., a cruising speed of 80 m.p.h., and a landing speed of 45 m.p.h. The climb is 5000 ft. in 12 min.

For longer flights, and carrying three persons, the machine can be fitted with an additional 25-gal. fuel tank. In this case the landing speed is 35 m.p.h. and the climb 1200 ft. in 1 min.

With five heavy passengers the H5 flies very well with the propeller turning at 1450 r.p.m., and it can climb under the same conditions at 1300 r.p.m. Future machines of this type will be fitted with a propeller turning 1650 r.p.m. in order to develop the full 170 hp.

The principal changes in construction relative the original Standard consisted in removing the dihedral, whereby the control was greatly improved, and in washing out the ailerons, which gives the control stick more leverage. At the same time all exposed wires and turnbuckles were streamlined, which materially increased the performance. On new ships of this type the fuselage and the cockpit will be covered with veneer in order to increase the strength of the structure.

As a certain amount of overheating was experienced with the original vertical radiator, two side radiators are now being fitted along the fuselage.

The saving in weight of engine and fuel due to the use of the Hispano-Suiza enables the Chamberlin-Standard H5 to carry for the same total weight two more passengers than the Standard fitted with either the Mercedes 160 hp. or the Isotta-Fraschini 170 hp. engine. Loaded light, and with a fair breeze, the H5 has often taken off in 50 ft. and outclimbed any airplane of its class for the first thousand feet.

Canadian Airharbors

Since the publication in our issues of Oct. 17 and Oct. 24, 1921, of the list of Canadian airharbors licensed by the Air Board, Ottawa, the license No. 48, issued to Niagara Air Service, 618 Dominion Bank Bldg., Toronto, Ont., for a commercial airharbor at Niagara Falls, Ont., has been cancelled. Date, Oct. 28, 1921.

The following airharbor has been licensed under No. 49, on Sept. 6, 1921:

Saskatoon, Sask. Commercial airharbor. situated 3 mi. NW of City Hall, Saskatoon. Latitude 52 deg. 10 min.; longitude 106 deg. 43 min.; altitude 1650 ft. above sea level. Local magnetic variation 23 deg. 5 min E of N. Maximum dimensions for landing 300 by 400 yd. Licensed for use by day only, and marked with a triangle equally divided by a vertical line (see diagram, AVIATION, Oct. 17).

Water and fuel supply. Facilities for running repairs only. Accommodation for two machines. Available communication to city of Saskatoon: motor transport, good roads.

Licensee: R. J. Groome, Box 285, Regina, Sask. (Y.M.C.A. Saskatoon, Sask.)

Photographic Forest Survey

The 15th Aerial Photo Section, located at Crissy Field, Presidio of San Francisco, Calif., made a photographic survey recently covering the district between Fort Bragg, Montague, and Mather Field, Sacramento, Calif. This survey is to furnish data regarding the value of forest patrol operations during the past summer.

Parachutes and Life Packs

By Floyd Smith

Concerning parachuting from aircraft, it seems that some of the most important items have not received notice.

For instance, more than 400 descents have been made with the Floyd Smith type life pack with following results:

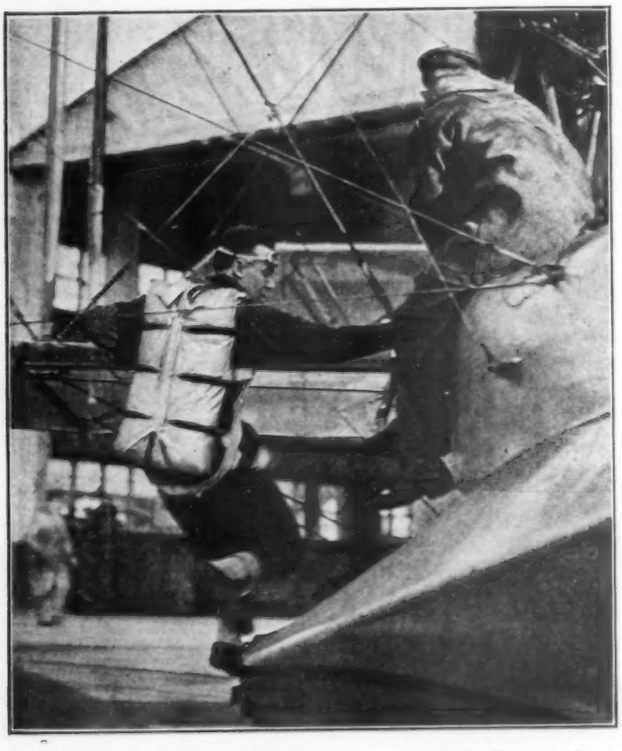
Twenty-eight descents made by totally inexperienced persons including five girls. To my knowledge three of these had never been in the air before.

Two lift off drops and one jump at less than 100 ft. altitude, two jumps at 125 ft., one jump at 150 ft., two jumps at 175 ft., one jump at 200 ft., and many between 200 ft. and 300 ft. up.

Two lift-off drops from wings in spin, one jump from wing in spin, and one jump and one lift off from rear cockpit in spin.

Two lift off drops from rear cockpit in slip.

About fifteen long falls before chute was released (known as delayed opening drops), ranging from 500 ft. to 1400 ft. Two released the chute while standing on the lower wing next to fuselage on JN in normal flight and pulled off under tail.



FLOYD SMITH CLIMBING INTO A NAVAL HS2L FLYING BOAT FOR A DEMONSTRATION OF HIS PARACHUTE

One accidently released extra pack while standing up in turret of a Lepere fighter and was dragged over tail, resulting in lacerated arm.

Otherwise no parachute or attachment fouled any part of planes. Four men were drowned by landing in water. Contrary to opinion, a silk chute slides off to one side when the weight is released and lays out away from the person, and the person does not get tangled in lines until after they sink. One parachute failed to open due to two lines being half hitched around all the others near the mouth of the chute in such way that it could not have happened after packing. One man was killed by being blown by a 30 m.p.h. wind into a tower, striking the back of his head on a sharp stone projection.

About 110 of these jumps were made with 23 ft. and 24 ft. parachutes. I know of only one fractured ankle and one sprained ankle from landing.

From the above it appears that this type of life pack has demonstrated that it may be used under any circumstances without danger of fouling the plane. It does not seem reasonable to suppose that an attached or anchored type pack could be used safely to meet several of the above tests, especially the spins. Neither does it seem that any parachute of the attached or anchored types could equal the free type at low altitudes, because the attached parachute is inherently slow in opening.

Any method of positively extending the lines or of positively opening the mouth of the parachute by pulling over a hoop or bell, necessitates the falling body pulling the lines to full length before the parachute is in a position to open. This results in accelerating the pull on the lines as the chute begins to open, which results in an inward pull and slow opening, and at times the vent vacuum.

In the Floyd Smith type the air strikes the parachute first, and while the lines are being stretched, the velocity of the parachute partly opens it so that the mouth is wider than any hoop or bell of practical size could make it when the lines take the load, resulting in a positive snappy opening. If ordinary care is taken in coiling the lines, tangling is impossible. In numerous tests where the lines were stuffed in without coiling, the worst tangles were not dangerous.

Eventually everyone who has contact with aircraft will absorb the ordinary knowledge required for the use of life packs under unusual conditions such as spins. At present the average person thinks the outside of the spin is the proper place to leave from. As a matter of fact it is practically impossible to get away from the outside, but if a person releases himself from the fuselage in rear of wings he will be thrown between inside wing and tail, far outside the spin circle.

It is entirely practical in a stall fall off spin at 75 ft. height to release the parachute from the rear cockpit and be lifted out safely. In fact one of the above noted drops was exactly the same thing at a greater altitude.

Most persons believe that a parachute demonstrator can take advantage of certain conditions and so do the work with greater certainty and safety than it could be done in emergencies. This is erroneous, however, for the demonstrator has many problems to face, while the person in an emergency has only one.

Chicago—New York Non-Stop with Five on Board

With Eddie Stinson at the controls, and carrying four passengers, a JL6 monoplane made on Nov. 25 a non-stop flight from Chicago to New York in 8 hr. and 50 min.

The plane left Ashburn Field, Chicago, at 7.55 a. m., and arrived at the J. L. Flying Field, Central Park, L. I., at 5.45 p. m. Pilot Stinson reported clear weather for the entire trip but extremely variable winds. Cleveland was passed over at 10.40 a. m. Shortly afterward Stinson got out his map of Pennsylvania, and while picking out his course for that state the map was suddenly blown out of his hands by the wind and lost. He was therefore compelled to fly a compass course over Pennsylvania. After one hour's flying Stinson sighted a river which he thought was the Hudson, and he followed it south in the assumed direction of New York, to shortly find himself approaching Philadelphia. The river, of course, was the Delaware. From Philadelphia the shortest route was followed to Mitchel Field where flares were set to light the machine in. The flying distance was approximately 780 miles not including the detour made via Philadelphia.

The JL6 began the flight from Chicago with 140 gal. of gas in tanks, five people, spare parts consisting of four tires, two wheels one propeller and tool and motor spare parts box, 200 lb. of baggage, a total of 2120 lb. of useful load. As the machine weighs empty 2400 lb. its total flying weight was therefore 4520 lb. at Chicago. The gas consumed during the flight was 125 gal.

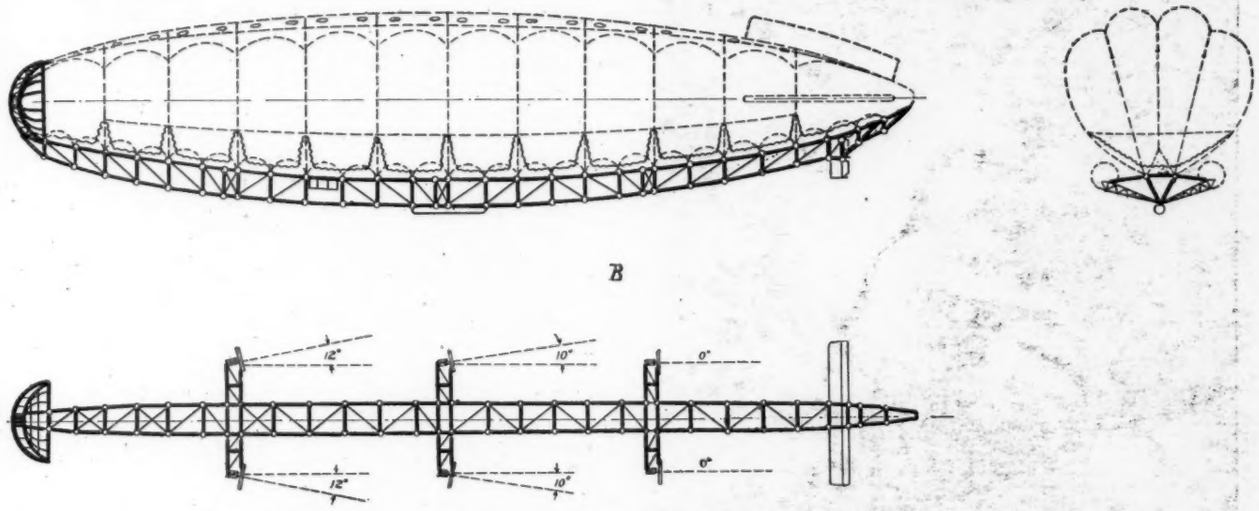
Semirigid versus Rigid Airships*

By Umberto Nobile

Director of the Italian Government Airship Factory

In connection with the first trial flight of the U. S. Army airship Roma, which took place on Nov. 15 at Langley Field, the following presentation of the advantages of the Italian semi-rigid type by Signor Nobile are of interest. Signor Nobile is with Celestino Usuelli and V. Prassone the co-designers of the Italian T type of airship, the first specimen of which is the Roma.

Following are the chief characteristics of the Roma: capacity 1,200,000 cu. ft.; length 412 ft.; maximum diameter 82 ft.; six 400 hp. Ansaldo engines in separate power cars, driving one propeller each; total horsepower 2,400; disposable lift 16 tons; high speed 68 m.p.h.; cruising range 5,300 miles; crew 12.—EDITOR.



GENERAL ARRANGEMENT DRAWINGS OF THE U. S. ARMY AIRSHIP ROMA, BUILT BY THE ITALIAN GOVERNMENT AIRSHIP FACTORY

There exist today two types of airships which are contending for supremacy: the semi-rigid Italian type and the rigid German type. The Italian semi-rigid airships comprise two sub-types: one having an articulated longitudinal beam, the other, a rigid longitudinal beam.

While for small volumes the superiority of the articulated beam type is generally recognized (and proved by the numerous requests from foreign Governments for sample airships of this type†) many experts maintain that, even for large sizes, the Italian semi-rigid type can successfully compete with the German rigid type.

Though there may be a doubt concerning the articulated type, there can be none whatever as regards the rigid girder type, as shown by the brilliant success of our experience with our first T type airship, the Roma. We are convinced that to whatever dimensions our T type may be increased (within practical limits) we shall always find that the particular characteristics which constitute its fundamentally good qualities are not only preserved, but even accentuated.

Of course, we do not say that great increase in capacity can be made without giving rise to difficulties. When the volume exceeds 3,500,000 cu. ft. the problems of construction and assemblage take on a certain importance, but though these problems may be difficult of solution they are never such as to lead to unfavorable conditions.

We consider that the essential reason why our type is superior to the German lies in the conception of the rigidity itself. In the German type the whole of the external surface is made rigid, even where the natural pressure of the gas is sufficient to preserve the shape. The Italians only make rigid those parts which really require such treatment, thus greatly simplifying construction and assembling, which more than compensates for the slight disadvantage of a less penetrating form. Moreover, as regards the preservation of the form, the rigid type does not appear to have much advantage over the Italian semi-rigid, since, with the rigid bow of the T type the excess pressure of the gas in the envelope can be maintained relatively low, without fear of any inconvenience arising either during navigation or during mooring operations.

The superiority of the Italian conception appears, however, not merely in simpler construction, but also, and more especially, in greater strength. This is evident when we compare the huge, delicate arrangement formed by the metallic framework of the Zeppelins with the strong, elastic backbone formed by the longitudinal beam of the Italian type. This backbone is strong because its parts, being relatively small and exposed to great forces, have a resistance which we seek in vain in the framework of the Zeppelin. It is elastic, because its articulated joints, the peculiar characteristic of our longitudinal beam, give it an elasticity which enables the airship to withstand shocks and bumps, while the Zeppelin, as experience has proved, cannot support such shocks without serious damage.

These are the two most important advantages of the Italian type over the German type. We may also mention the following:

1st. Rapidity and certainty in designing.

2nd. Rapidity of construction and utilization of materials of current use and constant characteristics.

3rd. Great rapidity and simplicity of mounting.

4th. Possibility of quickly dissembling the airship for purposes of storage or transport when it is not advisable to send it under its own power. We may note that the Zeppelin cannot be taken apart.

5th. Possibility in the future of assembling the airship out-

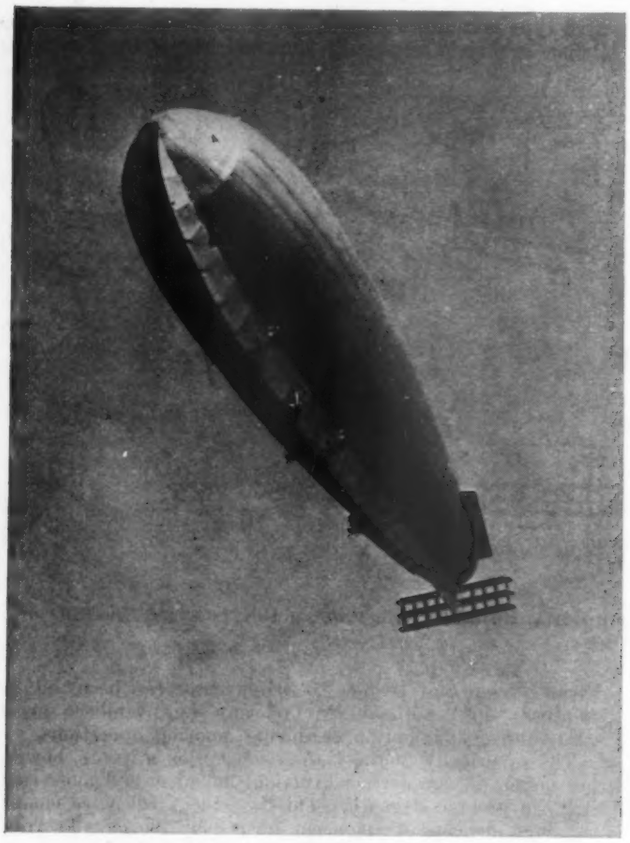
* Excerpt from an article published in *Giornale del Genio Civile*, translated by the Paris office, N.A.C.A.

† Our Airship Works have just completed an M type airship for England, and two O types, one for the United States, the other for the Argentine. Another of the same type is being built for Spain. The O type, derived from the P type, (Crocco-Riccaldoni) may be considered as the most successful of Italian small capacity airships. It was designed by Engineers Pesce and Nobile.

side the hangar. In fact, the assembling of our longitudinal beam complete with all its accessories, comprising the stiffening of the bow, the power plant, rudders, etc., can be done without inconvenience in the open air if it is protected from the weather by a temporary covering of limited dimensions. When the rigid part is assembled we can, given favorable conditions and fine weather, proceed rapidly to the inflation of the envelope and to its connection with the rigid part. After this, the airship may be ready in a few days, if not to fly, at least to be moored so that the final adjustments may be made without danger.

6th. Great facilities of inspection and repairing of single metallic parts. This considerable advantage arises immediately from the fact that the rigid part occupies only a small space, and also that the various parts are articulated together, so that a damaged part can easily be changed.

7th. Lower cost of construction and assembling. We need not dwell on this point. Greater rapidity of construction and



THE U. S. ARMY AIRSHIP ROMA IN FLIGHT

assembling together with the use of current materials must conduce to a lower cost of production.

This advantage, however, must be set off against the cost of operation. As a matter of fact, in the Italian type, when from any cause, the gas bag becomes inefficient, it must be entirely renewed. It is certain that to change one of the gas compartments of the Zeppelin is a much less costly operation, but, on the other hand, when we consider that the maintenance cost of the rigid portions is much less in the Italian type, we come to the conclusion that, on the whole, the upkeep of a Zeppelin is more costly than the upkeep of an Italian airship.

In summing up all the advantages of an Italian airship over a Zeppelin, we must, however, admit that in one point the latter is superior, namely, in the coefficient of head resistance. But we are convinced that this inferiority will soon be eliminated by successive improvements in the Italian type of airships.

Lectures on Commercial Aviation

There has been on the topic of aerial transportation so much false optimism on one hand and so much needless pessimism on the other that the average person is somewhat bewildered as to whether aviation is coming or going.

Engineering might be called the silent profession from the reticence with which its members conduct themselves in the discussion of topics of public interest. When engineers speak therefore it may generally be assumed that the opinions put forth are derived from a careful study of actual figures.

The Society of Automotive Engineers whose membership of 5000 is composed of many of the foremost engineers and which includes in its ranks a large number of aircraft designers, will hold a series of meetings through its Sections in several cities during the next month at which various speakers will tell what has actually been done both here and in Europe in the way of commercial aviation. Authoritative figures will be given showing the number of planes now in operation, the number of miles flown during the past year, the percentage of successful flights and the number of accidents to planes attending to business, as contrasted with the much greater loss of life and limb caused by spectacular stunting or through the use of imperfectly designed machines or the operation of planes by insufficiently trained pilots.

The cost of aerial transport per passenger-mile and per ton-mile will also be given. These figures will be obtained from flights that have actually been made on regular schedules both here and abroad.

Reports indicate that the machines of one foreign manufacturer during the past summer made 693 out of 725 trips scheduled; over 95 per cent. More than 160,000 miles was flown with no accidents whatever to cargo or passengers.

The annual report of our own Air Mail Service involves a much greater mileage. Of 7,659 trips planned, 7,081 were perfectly completed, or 85 per cent. Nearly half of the flights were made under bad weather conditions. A million and a half miles were flown and about 45,000,000 letters were carried.

After recounting what has been done to date, those scheduled to give the talks at the various meetings will discuss what problems are still to be solved. Subjects that will receive attention in this connection are airways, landing-fields, ground organization, legal aspects, radio and meteorological service and the relation of civil aviation to national defense. In connection with this last subject moving pictures will be shown of the recent aerial bombing operations against the surrendered German battleships.

Those who will take part in this national program include J. G. Vincent, conspicuously identified with the Liberty engine; representatives of the Army and Navy Air Services; Glenn L. Martin, one of the pioneers in aviation; Ralph Upson, balloon expert, and Assistant Postmaster General Shaughnessy, who will give information about the Air Mail Service.

The following dates have been fixed definitely:

Indianapolis	Dec. 5
Worcester, Mass.	Dec. 9
New York City	Dec. 15
Cleveland	Dec. 16
Philadelphia	Dec. 22

Other meetings will be held during the month at Cincinnati, San Francisco, Buffalo and Detroit.

New Speed Records

The Aero Club of France has homologated the following world's speed records made during the Deutsch Cup race.

Greatest speed over 1 km. 330.75 km.p.h. (206 m.p.h.) Holder, Sadi Lecointe on Nieuport-Delage, Sept. 26, 1921.

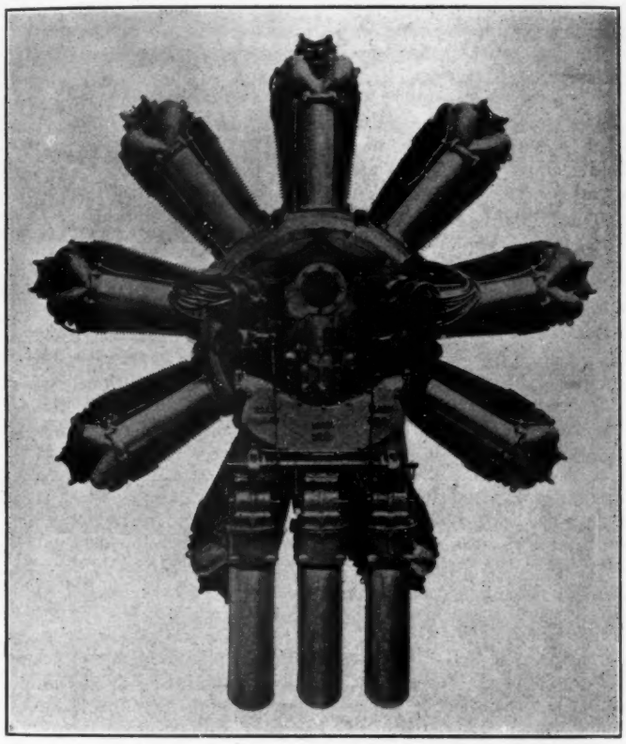
Speed over a distance of 100 km. 22 min. 5 2/5 sec. Brak Papa on Fiat, Oct. 1, 1921.

Speed over a distance of 200 km. 42 min. 39 4/5 sec. G. Kirsch on Nieuport-Delage, Oct. 1, 1921.

Tests of the 450 Hp. Bristol Jupiter Engine

The fact that the Bristol Jupiter aero engine has passed the British Air Ministry (March 1920) type test marks an epoch in the development of the air-cooled radial aero engine. Only two makes of engine, and these both water-cooled, have previously satisfied the rigid conditions laid down for this test. The results achieved with the Bristol Jupiter engine are the more meritorious when one considers that it is the lightest proved engine of its power in existence and that it is lighter per horsepower than either of the other two makes of engine which have previously received the type test certificate.

The engine upon which the tests were made has been manufactured under conditions complying with the directions of



Bristol Jupiter 450 hp. Radial Engine. Rear View.

the Air Navigation Regulations, 1919, and had previously run for 17 hr. and 41 min.

Arrangements for Test

The power curves, 30 hr. of the 90 per cent endurance test, high speed and high power tests, were carried out on a Heenan & Froude dynamometer, coupled to the engine through a special Bristol Carden shaft and universal joints. The tail extension of the dynamometer shaft is coupled through a dog clutch to a 100 hp. variable speed motor. Cooling was effected by a "Sirocco" fan, direct driven by a 270 hp. shunt wound motor, the fan supplying air at an average velocity of 85-90 m.p.h. taken on the axis of the duct, 5 ft. away from the engine. Twenty hours of the endurance test were carried out on the hangar with a propeller. The slow running and acceleration tests were also carried out on the hangar. Gasoline consumptions were measured by Mark III flow-meters, and in addition, check tests were made of the total amount of fuel used. 80 per cent Aviation, with 20 per cent Benzol mixture was used throughout the test.

Oil Consumption

A 9-gal. tank fed the engine under pressure, surplus oil from the engine being returned to this tank by the scavenger pump. An electric heater controlled the oil intake temperatures.

* Extracts from British Air Ministry's Report.

Power Curve No. 1

On Sept. 2, 1921, the following power curve was taken:

R.p.m.	Load on brake lb.	Hp. Bhp. corrd.	FUEL Total Pt.	FUEL Fuel Pt. Hp./hr.	B.m.e.p. on actual Hp. lb. per sq. inch	Time per reading Min.	Time per reading Sec.
1620	305.0	415	237	.576	115.0	2	45
1564	306.5	402	235	.588	116.0	2	55
1478	312.5	387.5	226	.588	118.0	2	38
1380	314.5	364	217	.600	119.0	2	54
1294	320.5	348	214	.619	121.0	2	50
1176	326.0	321.5	205	.642	123.0	2	45
1276	323.0	345.5	212	.618	122.0	3	00
1389	316.5	366.5	216.5	.595	119.5	2	35
1478	312.0	387	227	.591	118.0	2	54
1566	307.5	404	234	.584	116.0	2	30
1618	305.5	415	238	.578	115.5	2	35

Barometer : 29.70 inch
Weather : Fine
Fuel : Gasoline 80 per cent: Benzol 20 per cent.
Time : Start 21.20: Finish 22.10.

50 Hr. Endurance Test

The 50-hr. endurance test was then entered upon and the following are the tabulated results:

Date	Non-stop Hr.	Runs Min.	R.p.m.	Load lb.	Bhp. corrd.	Oil Pres.	Oil Cons. Pt./Hp. Hr.	Gasoline Pt. Hr.	Gasoline Pt. Hp. Hr.
3.9.21	1	45	1575	262.7	347.5	39.5	.054	203.3	.589
3.9.21	9	20	1577	262.5	347.5	35.4	.047	207.0	.600
5.9.21	3	00	1578	262.5	347.0	35.5	.046	206.1	.598
5.9.21	5	40	1575	262.8	348.0	35.0	.048	206.5	.598
6.9.21	8	15	1575	262.4	347.0	35.5	.050	207.8	.603
7.9.21	10	00	1575	Propeller		Approx. 35	—	200.1	—
8.9.21	10	00	1575	do.		Approx. 35	—	195.5	—
9.9.21			1576	262.75	349.5	36.2	.048	203.0	.589)
do.			1577	289.2	384.5	35.0	.051	226.0	.595)

Slow Running Test

On Sept. 8, 1921, the following slow running test was completed:

Time	R.p.m.	Oil Press.	Oil Temp.	Non-stop Hr.	Non-stop Min.
12.30/13.00	393	35	48	0	30

The running of the engine at these very slow revs. was steady, and the acceleration good.

High Speed Test

On Sept. 9, 1921, the high speed test was completed:

Time	R.p.m.	Load lb.	Bhp. Actl.	Bhp. corr.	Oil Pres.	Oil Temp.	Gasoline Pt. hr.	Gasoline Pt. hr.	Pt. hp. hr.	Non-stop hr.	Non-stop min.	Wind speed M.p.h.
18.53/ 19.53	1789	193.3	288	292	35.4	56	30.5	175	.608	1	00	88

This is purely a speed test to test bearings and was done with throttle partly closed.

High Power Test

On Sept. 9, 1921, the following high power test was completed:

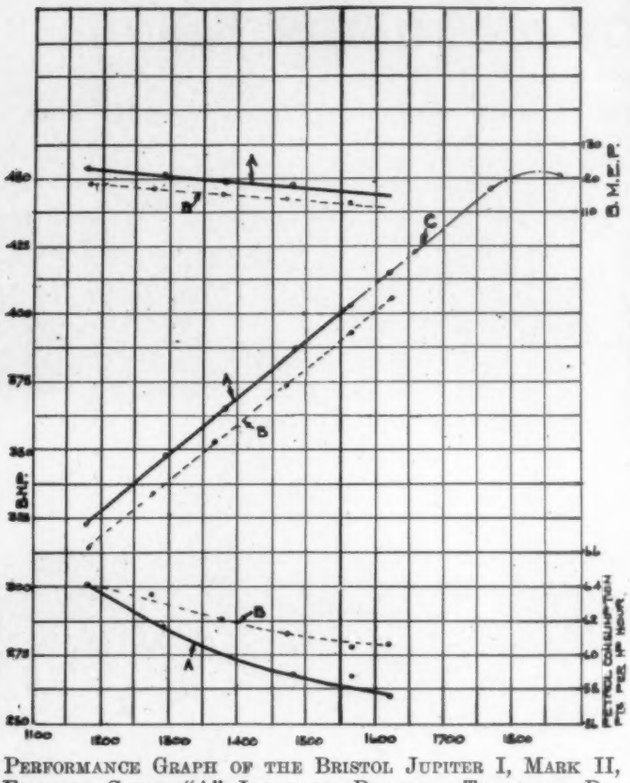
Time	R.p.m.	Load lb.	Bhp. Actl.	Bhp. Corr.	Oil Pres.	Oil Temp.	Pt./ hr.	Pt. hp. hr.	Gasoline Pt./ hr.	Gasoline Pt. hr.	Non-stop hr.	Non-stop min.	Wind speed m.p.h.
23.25/ 00.25	1623	2913	394	399	35	51.5	21.25	.054	241.6	.613	1	00	88.5

Power Curve No. 2

On Sept. 10, 1921, the second power curve was completed at the conclusion of the test as follows:

R.p.m.	Load on brake lb.	Hp. corrd.	Total pt. hr.	Specific pt. hp./hr.	B.m.e.p. on actual hp. lb. sq. in.	Time per reading— Min.	Time per reading— Sec.
1624	296	406	243	.608	111.5	2	45
1563	297.5	392	233	.601	113.5	2	40
1470	301	373.5	225	.610	113.0	2	45
1364	305.5	352	218	.628	115.2	2	45
1278	309.0	354	210	.638	116.2	2	36
1180	313.5	313	198	.640	118.0	2	30
1278	309.5	334.5	210	.637	116.8	2	18
1375	306.0	355.5	215	.613	115.3	2	45
1464	302.0	373.5	227	.615	113.6	2	30
1570	297.0	393.0	236	.608	112.0	2	32
1620	294.5	402.0	242	.609	110.5	2	34

Barometer : 29.54 in.
Weather : Fine
Time Start : 00.40 Finish 01.30.



PERFORMANCE GRAPH OF THE BRISTOL JUPITER I, MARK II, ENGINE. CURVE "A" INDICATES READINGS TAKEN AT BEGINNING OF RUN, "B" READINGS AT END OF RUN, "C" POWER OBTAINED AFTER TYPE TEST. ALL READING CORRECTED FOR ATMOSPHERIC PRESSURE

Oil and Gasoline Consumption

The average oil and gasoline consumptions throughout the test were:

Oil	.094 pt./hp./hr.
Gasoline	.594 "

These figures are worthy of close attention. With engines of the air-cooled type the gasoline consumption figures have previously been very high, but the figures recorded during this series of official tests with the Bristol Jupiter engine bear favorable comparison with the consumptions recorded by modern water-cooled engines.

Dismantling

At the conclusion of the tests the engine was dismantled for examination. Very little signs of wear were visible, and the general condition of the engine was found to be excellent.

Full Throttle Test

At the conclusion of the test, and without any further adjustments and replacements being made to the engine, cam sleeve (Part No. FB/2783) was substituted in the engine. This cam sleeve gives a slightly altered timing to accommodate higher engines revs. Power curve and one hour full throttle test at 1775 r.p.m. and at 1840 r.p.m. were then completed in order to ascertain the maximum power the engine would develop and to demonstrate that the engine has a good factor of safety at its rated power with the following results:

Time		R.p.m.	Load	Bhp.	Mep.	Consumption	
m.	s.						
2	45	1560	310	406	117.5	.596 pt./hp./hr.	)
2	53	1660	306	426	116	.587 "	) Power
2	55	1775	300	447	113.8	.57 "	) Curve
2	50	1875	293.5	462	111	.566 "	)

One Hour Full Throttle at 1775 r.p.m.

Average Bhp. = 442 Average Mep. = 113 lb. per sq. in.
Oil consumption ..... .0775 pt./hp./hr.
Gasoline do. ..... .588 "
Corrected to 760 m/m (Barometer).

One Hour Full Throttle at 1840 r.p.m.

Average Bhp. = 450 Average Mep. = 110 lb. per sq. in.
Gasoline ..... = .586 pt./hp./hr.
Oil consumption ..... = .11 pt./hp./hr.

One Hour Test Cutting out 3 Cylinders

The engine was set to run at 90 per cent of normal full power viz., 345 hp. at 1575. The gasoline from one carburetor was cut off, allowing the engine to run on six cylinders only. The engine was run 1 hr. non-stop under these conditions. Naturally there was a certain amount of vibration, but not excessive.

At the end of the hour, gasoline was turned on, and the engine picked up to full load at once. There was no oiling up of plugs. The results obtained on six cylinders were as follows:

Bhp.	193
R.p.m.	1250
Oil consumption	.0413 pt./hp./hr.
Gasoline do.	.685 "

This test was also carried out under the supervision of the Aeronautical Inspection Department.

Weight

The official weight of the engine complete is 729¼ lb., excluding exhaust pipes and intakes.

Among other points which are of much importance may be mentioned that owing to the design of the induction system the engine starts particularly easily, and owing to the air-cooling it is especially suitable for starting up in very cold climates. The Jupiter engine can also be more easily and rapidly dismantled and erected than any other engine of equal power and performance, and is claimed to have 25 per cent less parts than any other engine of equal power.

Control in Circling Flight

N.A.C.A. Report No. 112

This investigation was undertaken by the National Advisory Committee for Aeronautics at the Langley Memorial Aeronautical Laboratory for the purpose of developing instruments that would record the forces and positions of all three controls, and to obtain data on the behavior of an airplane in turns. All the work was done on a standard rigged JN4H (airplane No. 2 of N.A.C.A., Report No. 70). It was found that the airplane was longitudinally unstable and nose heavy; that it was laterally unstable, probably due to too little dihedral; and that it was directionally unstable, due to insufficient fin area, this last being very serious, for in case of a loss of rudder control the airplane immediately whips into a spin from which there is no way of getting it out. On the other hand, it was found possible to fly quite satisfactorily with the rudder locked, and safely, though not so well, with the ailerons locked. The value of Y_v was obtained in free flight, and when the effect of the propeller was subtracted, the agreement with the model test was excellent, but with the propeller revolving at 1350 the value of Y_v was nearly doubled. The value of L_v and N_v were little affected by the slipstream, but their values do not agree with the model test.

The Minimum Induced Drag of Aerofoils

N.A.C.A. Report No. 121

The Minimum Induced Drag of Aerofoils, by Max M. Munk, helps to explain the phenomenon of flight. It contains some theorems concerning the arrangement of airplane wings which are of considerable practical interest. In particular, it shows the theoretical reasons for the decrease of drag which accompanies all increase in the aspect ratio or lateral extension of a wing. The efficiency of a given arrangement of wings may be calculated from the formulae derived in this paper.

An Enthusiastic Aerial Passenger

Whenever opportunity offers, King Albert of Belgium always selects the air for his journeys, thereby enabling him to undertake engagements which it would otherwise be impossible to entertain. On Oct. 13 the King left Casablanca, Morocco, about 7 a. m. by the postal service airplane for Toulouse via Malaga, Alicante and Barcelona, arriving about 5 on Friday, Oct. 14. At Toulouse he took the train to Paris, and after a call next day upon M. Millerand, he left LeBourget by air again, in his own airplane, and arrived at Brussels a little after 3 p. m.

"Who's Who in American Aeronautics"

(Copyright, 1921, by The Gardner, Moffat Co., Inc.)

Every week, AVIATION AND AIRCRAFT JOURNAL prints the biographical sketch of men who are prominent in American Aeronautics. These sketches will be published later in pamphlet form. As so many of the officers change their stations often, it is believed that a semi-annual issue will be necessary. In compilations of this character many errors and omissions occur. It will be appreciated if corrections are sent to "Who's Who" Editor.

William M. Conant, Jr.

CONANT, WILLIAM M., Jr., Agriculturist; born, Boston, Mass., March 23, 1891; son of William M. Conant, Sr. and Mary (Bennett) Conant; married, Dinsmore Patrick, June 4, 1919.

Educated: Noble and Greenough private school; A.B. 1921, Harvard University.

Professional: 1912-1914, Manufacturing; 1914-1915, accounting; 1915-1917, salesman.

Aeronautical Activities: 1916, 1st Aero Squadron, New York National Guard; 1917, enlisted as cadet; commissioned 1st Lieut., Oct. 1917; overseas, Oct. 1917; finished training as chasse pilot at 3rd Aviation Instruction Center, Issoudun, Feb. 1918; appointed tester on airplanes at that field; April 1918 was made chief tester and promoted to Captain, Oct. 1918; returned to U. S. Feb. 1919; promoted to Major, March 1919; on duty until discharge as executive officer, Bolling Field.

Flying Rating: Reserve Military Aviator.

War Service: Air Service, U. S. Army, Aug. 1917 to Aug. 1919.

War Honors: Citation from General Pershing for exceptional, meritorious and conspicuous service in A.E.F.

Member: Harvard Club of New York.

Present Occupation: Agriculturist.

Address: Elkchester, Ky.

Reuben Curtis Moffat

MOFFAT, REUBEN CURTIS, 1st Lieut., Air Service; born, Brooklyn, N. Y., April 24, 1897; son of Dr. John Little Moffat and Elizabeth (Rhodes) Moffat.

Educated: Adelphi Academy, Brooklyn, N. Y.; Ithaca High School; 1914-1917, Cornell University.

Aeronautical Activities: Cornell Ground School, Dec. 1917; elementary training, Kelly Field No. 2, Feb. 1918; Camp Dick, Post Field, Taliaferro Field; Observation Pilot, 8th Aero Squadron, Nov. 1918 to Feb. 1919; Mitchel Field, Hazelhurst Field; Assistant Dept. Air Officer; commercial flying in Georgia, Alabama, Massachusetts and Maine; Assistant Air Officer, First Corps Area, Oct. 1920 to date.

Flying Rating: Reserve Military Aviator, Feb. 1918.

Member: Massachusetts Aero Club.

Present Occupation: 1st Lieut., Air Service.

Address: H. Q. First Area, 99 Chauncey St., Boston, Mass.; home, 198 Union Ave., Framingham, Mass.

Leonard Anderson Mack

MACK, LEONARD ANDERSON, Manufacturer; born, Wellmanville, Kans., Dec. 23, 1894; son of Orel Henry Mack and Sarah Emaline (Anderson) Mack; married, Helene Seeger, Nov. 9, 1920.

Educated: Grammar and high schools; two years college.

Professional: Standard Oil Co.; with saw mill company.

Aeronautical Activiites: Ground School, University of California, May 1918; training at Camp Dick and Post Field.

War Service: Army, May 1918 to Dec. 1918.

Present Occupation: Fruit Growers Supply Co. (Saw Mill).

Address: P. O. Box 1003, Susanville, Calif.; home, 428 Hill St., Reno, Nev.

Franklin Case Davies

DAVIES, FRANKLIN CASE, Student; born, Racine, Wis., Sept. 26, 1899; son of John P. Davies and Lillie E. Davies.

Educated: Racine grade and high schools; University of Wisconsin.

Aeronautical Activities: Instructor at Junior Plattsburg Camp, summer of 1919; passenger carrying at Lake Placid, N. Y. and Plattsburg, N. Y., until middle of Sept. 1919; testing for Curtiss N. Y. Aircraft Corp. and passenger carrying through N. Y. and N. J., summer of 1920.

Flying Rating: Reserve Military Aviator, June 1919 (No. 2044).

War Service: Army, Nov. 1918 to June 1919.

Present Occupation: Student.

Address: 16 Mendota St., Madison, Wis.; home, 744 College Ave., Racine, Wis.

Theodore A. Baldwin, Jr.

BALDWIN, THEODORE A. Jr., Colonel, Air Service; born, Fort Sill, Indian Territory, Aug. 1, 1878; son of Theodore A. Baldwin, Sr. and Cecelia (DeJaan) Baldwin; married, Agnes Judge, 1899.

Educated: Lake Forest Academy, Lake Forest, Ill.; Mass. Inst. of Tech.; Infantry and Cavalry School, 1906; Army Staff College, 1907.

Professional: Entered U. S. Army, 1898, with 5th Army Corps in Cuba in the battle of San Juan Hill; assigned to 24th Inf. and on duty with same until 1905; on duty at Army School of Line and Staff Colleges, 1905-1907; Captain, 8th Inf., 1905-1907; Captain, 26th Inf., 1907-1912; Captain, Quartermaster Corps, 1912-1916; Captain, 2nd Inf., 1916-1917; Major, 1st Inf., 1917; Lt. Col., National Army, 1917; Lt. Col., Air Service, 1917-1918; Colonel, Air Service 1918.

Aeronautical Activities: Detailed to Air Service, Oct. 1917; proceeded with A. E. F. to France same month; Personnel Officer, Air Service, A. E. F., Assistant to Chief of Air Service, A. E. F. until July 1918; in command of Orly Field, France, from July 1918 to April 1919; Chief of the Property Division, Off. Chief of Air Service, Washington, D. C., May 1919 to Oct. 1920; student, Fort Omaha, and Ross Field Balloon Observers' School from Oct. 1920 to Feb. 1921; Commanding Officer and Commandant, Ross Field, Balloon Observers' School from Feb. 1921 to date. (Nov. 1921).

Flying Rating: Balloon Obesrver, March 1921; Free Balloon Pilot.

Member: Army and Navy Club (Wash.); Metropolitan Club (Wash.); Chevy Chase Country Club (Wash.); California Club, Union League Club, both of Los Angeles, Calif.

Present Occupation: Colonel, Air Service.

Address: Ross Field, Arcadia, Calif.

James Leroy Zimmerman

ZIMMERMAN, JAMES LEROY, Homesteading; born, Ulysses, Nebr., Jan. 29, 1895; son of Elbert Burton Zimmerman and Mary Celestia (Wolcott) Zimmerman; married, Neta Naomi Crangle, June 9, 1920.

Educated: Public school, Lincoln, Nebr.; Doane Academy, Crete, Nebr.; Doane College; Casino Tech., Pittsburgh, Pa.

Professional: Commercial flying, 1920; Elec. Eng. at Westinghouse Electric Co., Mansfield, Ohio, to March 1921.

Aeronautical Activities: Ground School, Champaign, Ill.; primary flying and R.M.A., Kelly Field; advanced course in combat at Issoudun, France, 1918-1919; ferry pilot and courier at 1st Air Depot, France; passenger carrying in JN4D for Clarinda Aero Co., Clarinda, Iowa, 1919-1920.

Flying Rating: Reserve Military Aviator, Dec. 1919.

War Service: A.S.S.R.C., July 1917 to Sept. 1919.

Member: Aero Club of America.

Present Occupation: Homesteading.

Address: Glendo, Wyo.; home, 2020 S. 18 Street, Lincoln, Nebr.

William C. Young

YOUNG, WILLIAM C., Balloon Business; born, Mineral Ridge, Ohio, Jan. 14, 1892; son of Lewis H. Young and Ida A. Young.

Educated: Public schools of Mineral Ridge, Ohio; 1913, Hiram College; B.S. 1915, University of Virginia.

Professional: Goodyear Tire & Rubber Co. since July 1916.

Aeronautical Activities: Balloon pilot, 1918; Airship Pilot, 1918; Instructor, Wingfoot Lake Air Station, 1918; U. S. Signal Corps, 1918-1919; Aeronautical Mechanical Engineer.

Flying Rating: Balloon and Dirigible Pilot, Aero Club of America.

War Service: U. S. Signal Corps, A.M.E., 1918-1919.

Member: Aero Club of America; Akron University Club.

Present Occupation: Manager, Aeronautical Department, Goodyear Tire & Rubber Co.

Address: E. Market St.; home, 1559 Manchester Road, Akron, Ohio.

Frank S. Lahm

LAHM, FRANK S., Retired; born, Canton, Ohio, April 25, 1846; son of Samuel Lahm and Almira Webster (Brown) Lahm; married, Adelaide Way Purdy, March 1875.

Educated: Public schools of Canton, Ohio.

Professional: First exclusive dealer of American writing machines on the continent of Europe (1884).

Aeronautical Activities: First American to take up ballooning as a sport; first person to give a full account of what the Wright Brothers had accomplished, 1905; Nov. 1908, flight in aeroplane with Wilbur Wright at Le Mans; member of the Governing Committee of the Aero Club of France since 1906; member of the Aero Club of America since formation; 1907, founded the Aero Club of Ohio; American Vice President of the International Aeronautical Federation; Dean of balloon pilots of the Aero Club of France.

War Service: One and a half year's service during the war in the Lighter-than-Air branch in Washington, D. C.

War Honors: Decorated with Palmes academiques by the Minister of War of France.

Address: 13 rue Saint-Florentin, Paris, France.

Joseph F. Randall

RANDALL, JOSEPH F., Insurance and Bonding Business; born, Philadelphia, Pa., Aug. 12, 1882; son of John A. Randall and Mary E. Randall; married, Anna W. Foley, June 16, 1909.

Educated: Public schools of Phila; LL.B. 1917, National University.

Professional: Electrical contracting business; Attorney at Law.

Aeronautical Activities: Enlisted Oct. 12, 1917; commissioned 1st Lieut., S.R.C., Dec. 1921; training at Kelly Field; flying instructor at Mineola, L. I.; Captain, Air Service when discharged in Sept. 1919; commissioned Major, Jan. 1920.

Flying Rating: Reserve Military Aviator, Oct. 1918.

War Service: Army, Oct. 1917 to Sept. 1919.

Member: University Club; City Club (Wash.).

Present Occupation: General Insurance and Bonding business.

Address: 725 Alber Bldg.; home, 3146-19th Street, N. W., Washington, D. C.

Harry Leow Speck

SPECK, HARRY LEOW, 1st Lieut., Air Service; born, Quincy, Ill., July 8, 1892; son of Charles M. Speck and Elva R. Speck.

Educated: Public schools of Quincy, Ill. and Spokane, Wash.; University of Oregon and University of California. (Civil Engineering, three years).

Professional: Engineering and Horticulture from 1914 to 1917.

Aeronautical Activities: Commissioned 2nd Lieut. and transferred to Air Service, 1918; trained at Langley and Taliaferro Fields, 1918-1919; completed bombing course at Kelly Field, May 1921; flew Martin Bombers at Langley Field, June 1921.

Flying Rating: Airplane Observer, 1918; Airplane Pilot, 1919.

War Service: As above.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.; home, Medford, Ore.

Charles Michael Wightman

WIGHTMAN, CHARLES MICHAEL, Banking Business; born, St. Louis, Mo., Dec. 10, 1891; son of William Edward Wightman and Adela Augustine Wightman.

Educated: Baden School, Clay School, Yeatman School, all of St. Louis.

Professional: Five years with the Shapleig Hardware Co. of St. Louis; two years with The Valley Bank, Phoenix, Ariz.

Aeronautical Activities: Training at Post Field, Camp Dick and Barron Field.

Flying Rating: Airplane Observer, Dec. 1918.

War Service: Army, Dec. 1917 to Feb. 1919.

Present Occupation: Banking.

Address: Phoenix, Ariz.; home, 8559 Mora Lane, St. Louis, Mo.

Carl A. Miller

MILLER, CARL A., Banking Business; born, East Millstone, N. J., July 21, 1891; son of August C. Miller and Carolyn P. Miller; married, Charlotte Sanford Baker, Nov. 3, 1915.

Educated: Peekskill Military Academy; B.S. 1911, New York University; C.E. 1912, New York University.

Professional: One year as Assistant Instructor in Engineering in New York University; automobile business in Cincinnati, Ohio; 1913, American Telephone & Telegraph Co. of New York; 1920, Assistant Manager, Business Extension Department, Irving National Bank, New York.

Aeronautical Activities: Entered U. S. Air Service, Sept. 1917 and was detailed for service in the Office of the Director of Military Aeronautics at Washington as Executive Officer of the Section in Charge of Training the enlisted Mechanics Personnel for the Air Service; assistant in organization of enlisted Mechanics' Training School, St. Paul, Minn.; flying training, April 1918, Bolling, Langley and Chanute Fields; continued flying at various fields until discharged from the Army.

Flying Rating: Reserve Military Aviator, Jan. 1919.

War Service: Commissioned 1st Lieut., Signal Corps, U. S. Army and assigned to Air Service. Sept. 1917; promoted to Captain, Aug. 1918; discharged, Jan. 1919 as Major of the Reserve Corps.

Member: Ardsley Club, Ardsley-on-the-Hudson.

Present Occupation: Assistant Manager, Business Extension Department, Irving National Bank.

Address: 233 Broadway; home, Dobbs Ferry, N. Y.

Charles Everett Bauch

BAUCH, CHARLES EVERETT, Lieut., U. S. N.; born, Dorchester, Mass., May 26, 1897; son of Charles A. Bauch and Margaret C. Bauch.

Educated: Mechanic Arts High School; Huntington School; Tufts College.

Aeronautical Activities: On Navy submarine patrol during war; later, instructing in kite balloons and dirigibles; assigned to Bureau of Construction and Repair, Navy Department, as lighter-than-air test pilot, erecting and testing all new Navy lighter-than-air craft; Sept. 1921, assigned to Bureau of Aeronautics as lighter-than-air test pilot.

Flying Rating: Free Balloon Pilot, April 1918; Naval Aviator; Italian semi-rigid airship pilot No. 102.

War Service: U. S. Navy, April 1917 to date; flying on submarine patrol during war.

War Honors: Commandante di Dirigible Esploratore, (Italian).

Member: Aero Club of Massachusetts; Racquet Club (Wash.).

Present Occupation: Lieut., U. S. Navy.

Address: Bureau of Aeronautics, Navy Departmetn, Washington, D. C.; hame, 3 Clermont St., Dorchester, Mass.

Hobert Cutler Dickinson

DICKINSON, HOBERT CUTLER, Physicist; born, Bangor, Me., Oct. 11, 1875; son of G. Lyman Dickinson and Emma T. (Cutler) Dickinson; married, Elizabeth Wells, July 9, 1903.

Educated: Public schools of Alma, Nebr.; Williston Seminary, Easthampton, Mass.; B.A. 1900, M.A. 1901, Williams College; Ph.D. 1910, Clark University.

Professional: U. S. Bureau of Standards, 1903-1921; Graduate Laboratory Assistant, Assistant Physicist, Associate Physicist, Physicist, 1918-1921; Manager, Research Department, S. A.E., 1921 to date. (Nov. 1921).

Aeronautical Activities: Scientific Research, power plants, truck lubricants, and accessories.

War Service: Civilian status, in charge War Department Research.

Present Occupation: Manager, Research Department, S.A.E.

Address: 29 West 39th Street, New York City; home, 9 Ash St., Flushing, L. I., N. Y.

Hector B. Yates

YATES, HECTOR B., Teacher; born, Trenton, Tenn., Aug. 24, 1891; son of L. F. Yates and Florence Callis Yates.

Educated: Peabody High School, Trenton, Tenn.; Fitzgerald and Clarke School; B.A. 1915, University of Tennessee.

Professional: Teacher in public schools, 1915-1917; teacher in South Park High School, Beaumont, Tex. and Forest Avenue High School, Dallas, Tex., 1919-1921.

Aeronautical Activities: Jan. 1918, School of Military Aeronautics, Austin, Tex.; training at Camp Dick, Post Field; discharged Feb. 1919.

Flying Rating: Airplane Observer, Oct. 16, 1919.

War Service: As above.

Present Occupation: Teacher.

Address: Forest Avenue High School, Dallas, Tex.; home, Trenton, Tenn.

Virginius Evans Clark

CLARK, VIRGINIUS EVANS, Engineer; born, Uniontown, Pa., Feb. 27, 1886; son of Harry Scott Clark and Sarah M. (Clure) Clark; married, Rose U. Stoll, Dec. 20, 1917.

Educated: Public schools of Uniontown, Pa.; 1907, U. S. Naval Academy; Mass. Inst. of Tech.

Professional: Battleship fleet around world, 1908-1909; transferred to Coast Artillery, serving in Boston, San Francisco and Honolulu.

Aeronautical Activities: Transferred to Aviation Section, Signal Corps, 1913; received flying training; promoted to Captain; 1914, ordered to M.I.T. for aeronautical engineering course; 1915, in charge San Diego Experimental and Repair Depot; 1916, Chief Aeronautical Engineer, U. S. A.; served on Bolling Mission to Europe; 1917, promoted to Lt. Col., organized McCook Field; 1918, Commanding A.S. Supply Depot, Morrison, Va.; 1919-1920, Chief of Engineering, Engineering Division, Air Service, McCook Field; 1921, as Chief Engineer, Dayton Wright Co., designed seaplane for aerial photographic work, shipboard airplane for U. S. Navy and airplane and airdrome defense airplane for U. S. Army; first officer graduated from course in aeronautical engineering, M.I.T.; in charge of all army aviation engineering development and preparation of production facilities before the war; designed first American battle planes, U.S.A.C.-1 and C-2; as Chief Engineer, McCook Field, responsible for the engineering capacity for all Air Service development work, 1919-1920; designer of practically all U. S. A. Wing Sections.

Flying Rating: One of the oldest Army Pilots, certificate dated Nov. 4, 1913; Military Aviator.

War Service: Lt. Col. Regular Army, Air Service, entire period of war.

Member: Society of Automotive Engineers; University Club (Wash.); Engineers' Club (Dayton); Technology Club (N. Y.).

Present Occupation: Chief Engineer, Dayton Wright Co.

Address: 5 Shelton Apts., Dayton, Ohio.

Parker Dresser Cramer

CRAMER, PARKER DRESSER, Commercial Aeronautics; born, LaFayette, Ind., March 16, 1896; son of William Heman Cramer and Fanny (Dresser) Cramer.

Educated: Public schools of Bradford, Pa.

Professional: Flickenger Iron Works, Bradford, Pa., 1911-1913; Dresser Mfg. Co., 1914; Curtiss Aeroplane and Motor Co., Buffalo, N. Y., 1915-1916; Standard Aero Corp., Plainfield, N. J., 1916-1917; Aircraft Fireproofing Corp., Nutley, N. J., 1920; Cramer Flying Field, Clarion, Pa. to date.

Aeronautical Activities: Model experiments, 1908-1910; glider experiments, 1911-1912; field work, 1913-1914; mechanic in Curtiss factory, 1915-1916; Producton Engineer, Standard Co., 1916-1917; cadet, instructor and test pilot, U. S. Army, 1917-1919; experimental and commercial flying, 1919; General Superintendent, Aircraft Fireproofing Co., 1920; commercial flying at Cramer Field, Clarion, Pa., 1920 to date.

Flying Rating: Reserve Military Aviator.

War Service: Dec. 1917 to May 1919.

Member: Aero Club of America; Clarion Aero Club.

Present Occupation: Commercial Aeronautics.

Address: Cramer Flying Field, Clarion, Pa.; home, E. Main St., Smithport, Pa.

Victor Parks, Jr.

PARKS, VICTOR, Jr., Captain, Air Service; born, Norfolk, Va., Dec. 7, 1895; son of Victor Parks, Sr. and Ena Lee Parks.

Educated: Moury High School, Norfolk, Va.; B.S. 1915, Virginia Military Institute.

Aeronautical Activities: Flying (pilot) A. E F., French Escadrille, 123 Brequet, C.O., American 166th Aero Squadron, 1st Army.

Flying Rating: French Pilot, 1917; Reserve Military Aviator, 1917; Airplane Pilot, 1921.

War Service: As above.

War Honors: Croix de Guerre, Nov. 11, 1918; Army Citation, A. E. F., Nov. 1918.

Present Occupation: Wing Operations Officer, Kelly Field.

Address: Kelly Field, San Antonio, Tex.

Wheeler Williams

WILLIAMS, WHEELER, Student; born, Chicago, Ill., Nov. 3, 1897; son of Lawrence Williams and Adele Holbrook (Wheeler) Williams.

Educated: Chicago Latin School; Phillips Exeter Academy; Ph.B. 1918, Yale Sheffield Scientific School; Harvard Graduate, School of Architecture.

Aeronautical Activities: Cadet courses and duty as Flight Instructor in balloons.

Flying Rating: Aerial Observer, Oct. 1918.

War Service: March 1918 to June 1919.

Present Occupation: Student of Architecture.

Address: Robinson Hall, Cambridge, Mass.; home, 56 Bellevue Place, Chicago, Ill.

Lorenzo Lamont Snow

SNOW, LORENZO LAMONT, Captain, Air Service; born, Brigham City, Utah, Aug. 26, 1885; son of Lorenzo Snow and Minnie (Jensen) Snow.

Educated: Washington and Lowell Schools, Salt Lake City, Utah; L.D.S. University,, 1904; 1908, University of Utah.

Professional: Studied internal combustion engines in England, France and Germany, 1906-1907; partner in design and manufacture and test of Hansen-Snow Aviation Engine, Pasadena, Calif., 1909-1910; owned and operated cattle ranch in Arizona, 1911-1912; designed and constructed amateur astronomical instruments and continued study of aeronautical power plants, 1913-1915.

Aeronautical Activities: Began flying training July 1916; Instructor in flying, Selfridge Field, 1917; 1st Asst. Eng. Officer, Nov. 1917 to March 1918; Chief Engineer Officer, 1918, Ellington Field; Tech. Liaison Officer, July 1918, Night Bombardment, Base Sec. No. 3, A. E. F.; Chief Eng. Officer, Ford Junction Airdrome, England, Aug. 1918; Commanding Officer, Tangmere Airdrome, Chichester, England, 1918; Chief of Cooling Systems Branch, Power Plant Sec. Engr. Division, Air Service, McCook Field, Jan. 1919 to date. (Nov. 1921).

Flying Rating: Reserve Military Aviator, July 1917; Pilot's License, Aero Club of America, No. 4997.

War Service: As above.

Member: Astronomical Society of the Pacific; Dayton City Club; Aero Club of America.

Present Occupation: Captain, Air Service; Engineer, Power Plant Sec. Engr. Div.

Address: McCook Field, Dayton, Ohio; home, 141 N. Grand Ave., Pasadena, Calif.

James Frederick White

WHITE, JAMES FREDERICK, Certified Public Accountant; born, Brooklyn, N. Y., Oct. 16, 1876; son of Charles Carrol White and Charlotte (Locke) White; married, Maude Seaman, July 9, 1907.

Educated: Brooklyn public schools; 1896, New York Law School; New York University School of Accounts and Finance; New York State Certified Public Accountant No. 580, March 25, 1912.

Professional: Law until 1906; Real Estate and Law to 1908; firm member, Latimer, Rhodes & White, Accountants, 1908-1912; firm member, White & Reeve, Certified Public Accountants, 1912 to 1917; in U. S. Army, 1917 to 1919; 1920 to date, firm member, James Frederick White & Co., Certified Public Accountants.

Aeronautical Activities: Plattsburg Training Camp, 1917; 1st Lieut., 49th Inf., 1917; Dec. 1917 to Aug. 1918, Personnel Officer, Aviation Section Signal Corps; Captain and Commanding Officer, 6th Detachment A.S.A.P.; Sept. 1918 to July 1919, District Manager of Production, Detroit, Mich.; promoted to Major, Air Service and discharged July 1919.

War Service: As above.

Member: Garden City Country Club; Army Athletic Association; American Legion, Accountants Post No. 816 and Rockville Centre Post No. 303.

Present Occupation: Certified Public Accountant.

Address: 33 West 42nd Street, New York City; home, 129 Wellington Road, Garden City, Long Island, N. Y.

George Churchill Kenney

KENNEY, GEORGE CHURCHILL, Captain, Air Service; born, Yarmouth, Nova Scotia, Aug. 6, 1889; son of Joseph Atwood Kenney and Louise (Churchill) Kenney; married, Hazel Dell Richardson, Oct. 16, 1920.

Educated: High school, Brookline, Mass.; 1911, Civil Engineering, Mass. Inst. of Tech.

Professional: Civil Engineer with Quebec & Saguenay Railroad, 1911-1912; Stone & Webster, Engineering Corp., 1913; President, Beaver Contracting & Engineering Corp., 1914-1917.

Aeronautical Activities: Cadet, Mass. Inst. of Tech. Ground School, 1917; Hazelhurst Field, L. I., 1917; advanced training at Issoudun, France, Dec. 1917 to Feb. 1918; at the front from May to Nov. 1918; credited with one enemy plane on Sept. 15, 1918 and another on Oct. 9, 1918; commissioned Captain, Air Service, March 1919; returned to U. S., July 19, 1919; Border Patrol duty, 1919-1920; Air Service Engineering School, McCook Field, Nov. 1920 to Sept. 1921.

Flying Rating: Reserve Military Aviator, Sept. 1917; Airplane Pilot.

War Service: June 1917 to end of war.

War Honors: Distinguished Service Cross, Nov. 1918; citation from General Pershing, March 1919.

Member: Aero Club of America; Archie Club of Boston.

Present Occupaton: Captain, Air Service.

Address: Mitchel Field, L. I., N. Y.; home, 4 Egremont Road, Boston, Mass.

The Safety of American Civil Aviation

By Otto Praeger

The very interesting study of civil aviation recently published by The National Bank of Commerce in New York brings home the painful absence in this country of statistics on civil aerial activities, save for the record kept by the government of the operations of its Air Mail Service. How serious this statistical void is, may be gathered from the impression which the article in question leaves that airplane casualties in the United States are as bad is in Great Britain or Canada, whereas the number of civilian airplane fatalities in the United States, per thousand miles flown, are perhaps one-half as great as in England or Canada.

Here are the official records:

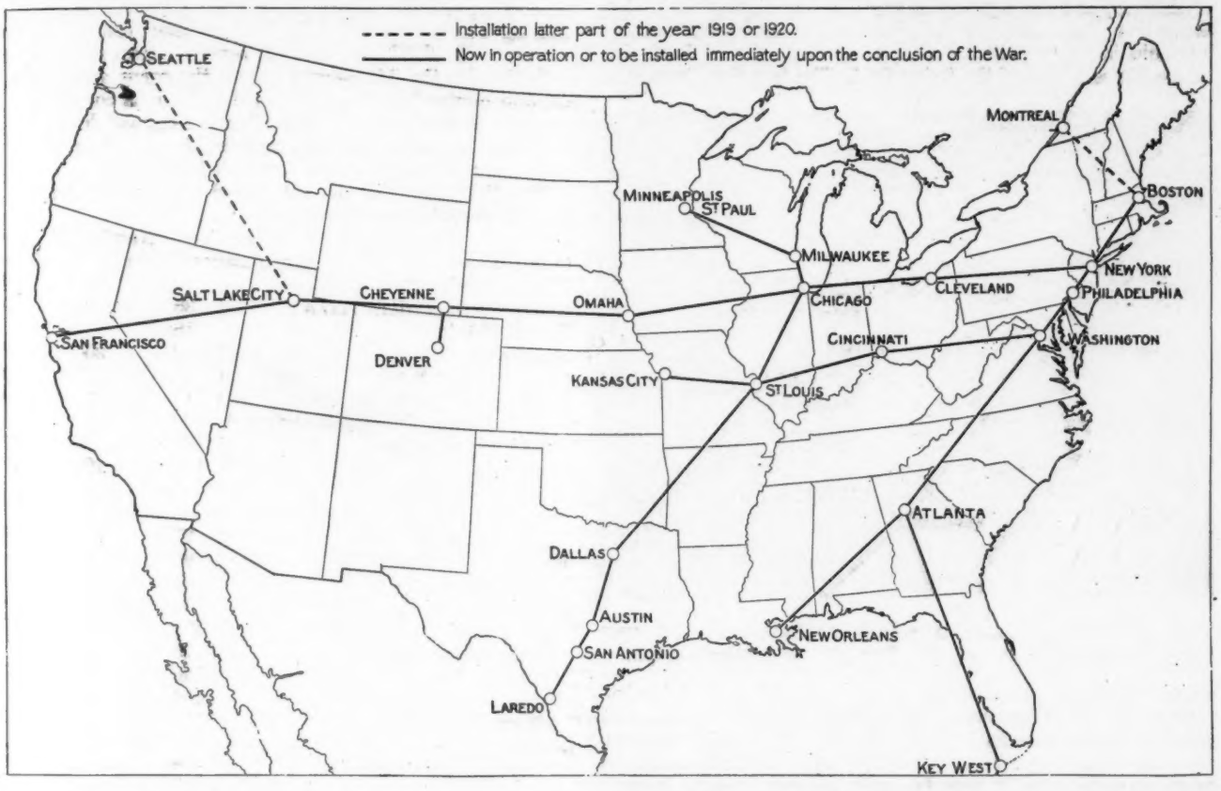
Canada, 422,462 miles with 5 accidents resulting in the death of *one or more* persons, making *at least* one person killed in every *84,493* miles flown.

Great Britain, 1,593,700 miles with 20 deaths, making one person killed for every *79,685* miles flown.

U. S. Air Mail, 2,000,000 miles completed March 18, 1921, with 23 deaths, making one person killed for every *94,084* miles flown.

Although the airplane fatalities per 1000 miles flown in the U. S. Air Mail Service under 34½ months under my administration are notably less than the British or Canadian record, the comparison is hardly fair to American aviation as a whole. It should be noted that the U. S. Air Mail record is for daily cross country work, winter and summer, over three bad mountain ranges, the Alleghanies, the Rockies and the Sierra Nevadas, and over a great western desert, with about 2½ hr. as the average duration of flight, while the Canadian and British records are for flights of average duration in England of 19 min. and in Canada of 21 min.

The splendid performance over very great mileage of the Aeromarine company between Havana and Key West and elsewhere, and the steady operations of the contract mail service between Seattle and Victoria, B. C.—all without fatalities—to which must be added the hundreds of thousands of miles of short passenger carrying flights all over the United States, with their comparatively rare fatalities, furnish a record strictly comparable with the Canadian and English statistics.



THE ORIGINAL PLAN OF ORGANIZATION OF THE U. S. AIR MAIL SERVICE (1918). OWING TO LIMITED APPROPRIATIONS ONLY THE NEW YORK—SAN FRANCISCO ROUTE IS IN OPERATION AT PRESENT

Our lack of statistics is to blame for the impression in even well informed quarters that "In the United States the number of casualties, both in military and *civil* flying, is alarming." We owe it to commerce, which we seek to interest, and we owe it to the public whose good opinion we need, to maintain accurate statistical information of our widely scattered aerial activities.

It occurs to me that this can be done even in advance of legislation. Such statistics in other lines of business are gathered by the Department of Commerce without specific direction from congress, and that far reaching and efficient department of the government might be persuaded to undertake the work.

There are several reasons why it seems especially desirable that the Department of Commerce should undertake this task. It has a nation wide organization. Its requests carry the weight of government authority. But looking to the future, it would mean that there would be already in existence in a great department of the government an agency devoted to fostering commercial aviation which would require but an extension of power from congress to convert it into an arm of the government clothed with power to regulate and supervise, as well as to develop, commercial aviation.

Air Service Develops Radio Controlled Automobile

Recent visitors at McCook Field, the home of the Engineering Division of the Air Service at Dayton, Ohio, have been astonished at the gyrations of a brightly painted three-wheeled vehicle which has been dashing to and fro between the buildings and among the airplanes on the field under no visible means of control. It is often seen to approach a group of persons blowing its horn wildly, and then when apparently about to strike them, to stop short with screeching brakes, back up with loudly clanging blow, make a sharp turn to the right or left, and to start off in the opposite direction. Great mystification has been shown as to the method of operation of this car, and the mystery is lessened but slightly when they learn that the movements of the car are controlled entirely by radio impulses, which are sent out from the radio station at the opposite end of the flying field. The fact that there is no

THE RADIO-CONTROLLED AUTOMOBILE DEVELOPED BY THE ENGINEERING DIVISION, AIR SERVICE, AT MCCOOK FIELD

aerial or antenna system visible merely adds to the mystification.

The car is of cigar shaped construction about 8 ft. long, and runs on three pneumatic tired wheels. It travels at speed ranging from 4 m.p.h. to 10 m.p.h. and the controls are so finely adjusted that it may be easily steered along a narrow road-way.

An examination of the interior of the car shows an amazing and confusing collection of batteries, switches, wires, vacuum tubes, potentiometers, relays, magnetos, etc., all of which are, of course, necessary to the complete control of the apparatus. The most interesting part of the apparatus is the "selector" which is in reality the heart of the entire control system. Various combinations of dots and dashes are sent out by means of a specially constructed transmitter, each combination calling for the accomplishment of a certain operation of the control apparatus. It is the function of this selector to "decode" these various combinations of dots and dashes which are sent out, and to close the circuits to the desired controls. So delicately is this selector constructed, and so rapidly will it operate, that it is possible to put into operation any one of twelve distinct controls in a period of less than one second. That is to say, less than one second elapses from the time any push button on the automatic transmitter at the distant radio station is pressed until the control on the car is in operation. Such speed of control has never before been accomplished. This car has been controlled equally well from an airplane and from a ground transmitting station.

The possibilities of radio control and its application to war time problems are almost without number. Radio control can be applied to any mechanical apparatus that moves, whether it be in the air, on the ground, on the surface of the water, or beneath the water. Huge land tanks may be constructed and filled with T.N.T. and driven to any desired point along the enemy's lines where the explosive can be fired by means of radio, or it can be applied in a similar manner to a boat, submarine, torpedo, or even an airplane.

Resumption of Recruiting for Air Service

The Air Service is in immediate need of over 3,000 enlisted men to fill existing vacancies, and authority for the procurement of these recruits was contained in a letter from The Adjutant General of the Army which outlined the procedure to be followed in securing recruits.

Recruiting will again be conducted under the direction of Corps Aera Commanders. Under this plan the Air Officer is the representative of the Chief of Air Service for all matters pertaining to recruiting for the Air Service within the corps area, and therefore the successful solution of the present recruiting problem is directly in the hands of the Air Officer. Each Corps Area Air Officer and the Commanding Officer of Bolling Field, Anacostia, D. C., has been directed to submit on Dec. 31, 1921, a detailed report concerning recruiting activities for the Air Service within the corps area or district. Certain quotas have been assigned to various corps areas, but as these do not take into consideration current losses through discharge, it will be necessary from time to time to increase those quotas to compensate for such losses.

The distribution of the authorized strength of the Air Service by organization is as follows:

Organization	Strength of Organization	Number of Organizations	Total Strength
Wing Headquarters	20	1	20
Group Headquarters (H/A)	35	6	210
Group Headquarters (L/A)	18	1	18
Squadrons	132	25	3300
Squadrons (R.S.)	90	10	900
Balloon Companies	130	3	390
Balloon Companies (Coast Defense)	100	8	800
Airship Companies	130	6	780
Air Parks	172	10	1720
Branch Intelligence Offices	5	6	30
Air Offices Casual Detachments	4	6	24
Photo Sections	20	13	260
Field Officers School	96	1	96
Photo School	51	1	51
Airship School	150	1	150
Pilot School	500	1	500
Gunnery Detachment	75	1	75
Mechanics School	100	1	100
Observation School	400	1	400
Balloon School	150	1	150
Flying Cadets	..	..	276
Communications School	50	1	50
			10,300

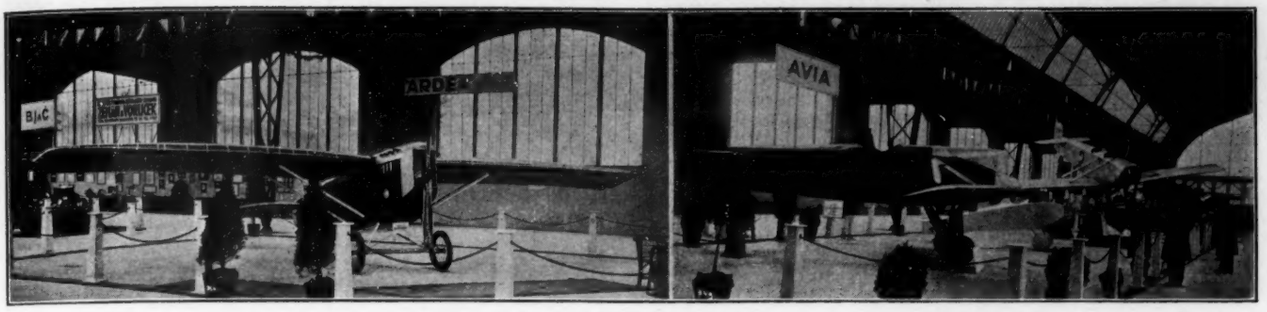
The following vacancies for enlisted men now exist at Air Service stations:

	Heavier-than-Air	Lighter-than-Air
Mitchell Field, N. Y.	479	
Aberdeen, Md.	3	33
Lee Hall, Va.	..	84
Langley Field, Va.	168	206
Montgomery, Ala. Air Intermediate Depot	33	
Carlstrom Field, Arcadia, Fla.	305	
Camp Knox, Ky.	55	
Scott Field, Belleville, Ill.		87
Chanute Field, Rantoul, Ill.	976	
Fort Riley, Kansas	110	
Brooks Field, San Antonio, Texas		166
Ellington Field, Houston, Texas	296	
Kelly Field, San Antonio, Texas	443	
Post Field, Fort Sill, Okla.	4	91
Rockwell Field, San Diego, Calif.	9	
March Field, Riverside, Calif.	113	For duty in Hawaii
Bolling Field, Anacostia, D. C.	95	

Course for Enlisted Men at Communication School

A new class for enlisted men, with 25 attending was opened at the communications school Fort Sill, Okla., on Oct. 17. This course will last for three months. It is a combined radio operators' and radio mechanics' course. Graduates will be qualified for both ratings.

Second Prague Aero Show



LEFT: ARDEA BP1 (70 HP. MERCEDES) SCHOOL MONOPLANE. RIGHT: IN FOREGROUND AVIA BH3 (185 HP. BMW) PURSUIT MACHINE. IN BACKGROUND AVIA BH1 (50 HP. GNOME) SPORT TWO-SEATER

The second aero show organized by the Czechoslovak Aero Club under the patronage of the president of Czechoslovak Republic, Dr. Thomas G. Masaryk, took place from Oct. 22 to 30, last, at the Palace of Industry, Prague, which has a surface area of 100,000 sq. ft.

Owing to the active assistance of the government, the participation of numerous local and foreign aircraft manufacturing firms and the interest displayed by the public, the show proved a great success. The exhibition was opened by the minister of public works Tueny, who emphasized in his inaugural address that the Czechoslovak government would spare no effort in the development of a self-supporting national aircraft industry. As a proof of this policy, the exhibition was visited by President Masaryk together with several cabinet ministers, generals, and other officials of the government.

It is the intention of the Czechoslovak government to make of their country the leading air power among the new countries of Central Europe. Judging by the two samples of Czechoslovak airplanes illustrated herewith, this plan seems to be well on the way toward its ultimate goal.

Following is a list of the aircraft firms which exhibited machines at the second Prague Aero Show:

The Compagnie Franco-Roumaine de Navigation Aérienne which is running the air transport service on the Paris—Strasbourg—Prague—Warsaw route exhibited a Blériot-Spad commercial airplane fitted with the 260 hp. Salmson engine.

The Societa Anonima Fiat of Turin exhibited a 300 hp. radial 9 cylinder engine and a 400 hp. eight V type cylinder engine.

The Aero aircraft works of Prague exhibited the Ae.0.2 pursuit plane, designed by Vlasak-Husnik, (220 hp. Hispano-Suiza), the Ae.0.3 pursuit plane designed by Engineer Rösner (Hispano-Suiza) and the Ae.0.4 pursuit plane designed by Vlasak-Husnik (185 B.M.W.).

The Avia Works of Prague-Vysocan exhibited a sporting monoplane two-seater Avia B.H.1. fitted with a 48 hp. Gnome, a sporting monoplane Avia B.H.2 fitted with a 20 hp. engine and a pursuit monoplane Avia B.H.3, fitted with a 185 hp. B.M.W. engine.

The Military Aircraft Works of Prague-Gbely exhibited the two-seater fighter biplane Sm.2 (designed by Smolik) fitted with a 260 hp. Maybach engine.

The Ardea factory exhibited the school monoplane B.P.l. fitted with 70 hp. Mercedes engine.

THE CONTEST COMMITTEE
of the
AERO CLUB OF AMERICA

Requests all owners (individuals or companies) of aircraft in the United States to register in order that the Committee may

1. Send, gratis, the Aero Club's Contest Rules for 1922, and notices of proposed aviation meets.
2. Assist local Clubs in organizing contests best adapted to the types of airplanes in their locality.
3. Have a record of airplanes and pilots available throughout the country in times of emergency.

USE THIS FORM.

CONTEST COMMITTEE, AERO CLUB OF AMERICA;
11 East 38th Street, New York City

Date .....

I / We) have ..... (Give number)
(Airplanes)
(Seaplanes)
(Flying Boats)
(Airships)
(Free Balloons)

Make and Model .....

Motor, Make and Model .....

Maximum speed of .....m.p.h.

Capable of continuous flights of ..... miles

Cubic capacity of gas bag ..... cu. ft.

Underwriters' Laboratories Aircraft Registration No. .....

Pilot's name .....

Address .....

Owner's name .....

Address .....

Foreign Aeronautical News

Czecho-Slovakia

Prague is slowly but surely becoming an air port of some importance, a position to which her geographical situation would appear to entitle her. The airdrome is situated at Kbley, a small village on a plateau to the northeast of Prague, forming a splendid natural site for an airdrome. It is here that the machines from Paris, which depart from LeBourget at six in the morning, arrive at about two o'clock in the afternoon leaving again for Paris the next morning at 11 a. m.

England

In accordance with plans approved a year or more ago official steps, it is stated, are being taken toward replacing the greater part of the army of occupation in Mesopotamia by units of the Royal Air Force. This will not only tend to save the government many millions a year in expenditures for the army, but will afford a great object lesson in the value of aircraft in carrying out the almost purely police duties of an army of occupation.

France

For some time it has been the intention of the Franco-Roumanian Aviation Co., who operate the Paris-Strasburg-Prague-Warsaw air line, to extend their line to Bucharest and Constantinople. On October 22 the first direct flight was made to Bucharest, and occupied 14 hr., including the stops at Strasburg, Prague and Budapest. By train the journey occupies about 63 hr., so that the saving effected is very considerable. For the extension to the Turkish capital, a new machine has been ordered, one of the four-engined Bleriot S45 types which was exhibited at the Paris show. The new machine is stated to have accommodation for sixteen passengers with baggage and to have an average speed of 120 m.p.h.

Encouraged by the success attained during the German gliding competition in the Rhön hills this year, France has resolved to hold, next year, a somewhat similar competition. At present it is proposed to hold the competition from July 6 to 20, 1922. The competition is to be organized by the French Aerial Association.

France is gradually turning the port of Antibes into an important air station, and it is hoped to establish air lines running to Corsica, Sardinia and Tunis, using Antibes as the French terminus. On Oct. 18 a seaplane flew from Antibes to Corsica (Ajaccio) in 3 hr. and 10 min., which is a very great saving of time as compared with the time taken by steamers.

Italy

A regular aerial service has been established by the colonial government of Lybia between the cities of Tripoli and Homs. The airplanes used belong to the Army and are part of the aerial force stationed in the Colony. Airplanes of the Caproni 450 type are used for transporting passengers and the S.V.A. 10 types are used for transporting mail. The distance between these two cities is only 100 kilometers.

The safety of commercial aviation in Italy is illustrated by the official report of the activities of the Civil Aerial Transport Company (Societa Anonima Imprese Aeree) covering the first years of its operation from June 1, 1920, to June 1, 1921. A total of 996.11 hr. were flown over a distance appproximately 62,000 mi., 3,351 passengers being carried without accident. This line did not operate during the months of December and January. The greatest number of passengers (591) were carried in July, 1920, followed by September with 520, and the lowest number carried during any month (138) was in March 1921. Passenger traffic was heaviest during the summer months.

Mexico

A recent newspaper dispatch reports that the Mexican aviator Jorge Puflea made a flight from Ciudad Juarez to Tampico in an Italian Ansaldo plane, carrying six passengers.

Three Lincoln Standard planes have recently been set up, and it is reported that they are intended for mail service and the transportation of passengers between Mexico City and Tampico. These planes will be used by the Mexican Aerial Transportation Co.

Where to Fly

CALIFORNIA
SAN FRANCISCO, CALIFORNIA
EARL P. COOPER AIRPLANE & MOTOR CO.

ILLINOIS
CHECKERBOARD AIRPLANE SERVICE
FOREST PARK, ILLINOIS

INDIANA
One of the largest and best equipped flying fields in the United States.
CURTISS-INDIANA COMPANY
Kokomo, Indiana
ALL TYPES OF CURTISS PLANES.

MASSACHUSETTS
BOSTON AND SPRINGFIELD, MASS.
EASTERN AIRCRAFT CORP.
340 FIRST ST., BOSTON, MASS.

MINNESOTA
WHITE BEAR LAKE, MINN.
The Twin Cities' chief summer resort.
Harold G. Peterson Aircraft Company
SCHOOL OF AVIATION

NEW JERSEY NEW YORK AIR TERMINAL
800 Acres — 6 miles from Times Square.
Learn on ships that cannot tail spin. Planes rented $30. hr.
CHAMBERLIN AIRCRAFT
Instruction Div. — 3609 Broadway, N. Y. City,

NEW YORK & NEW JERSEY
CURTISS FIELD, GARDEN CITY, LONG ISLAND
KENILWORTH FIELD, BUFEALO, N. Y.
FLYING STATION, ATLANTIC CITY, N. J.
CURTISS AEROPLANE & MOTOR CORPORATION

NEW YORK
AEROMARINE AIRWAYS, INC.
Times Building, New York
11 Passenger Flying Cruisers -- 5 passenger, open and enclosed Flying Boats. Sightseeing Tours - Flights to Shore and Lake Resorts

OHIO
DAYTON, OHIO.
Supplies, Hangars, Shops and Field 1 Mile from Dayton limits.
JOHNSON AIRPLANE & SUPPLY CO.

OREGON
LAND OR WATER FLYING
OREGON, WASHINGTON AND IDAHO AIRPLANE COMPANY
PORTLAND, OREGON

PENNSYLVANIA
Flying School and Commercial Aviation
Send for Circular
Official Flying field Aero Club of Pennsylvania
PHILADELPHIA AERO-SERVICE CORPORATION
636 Real Estate Trust Building, Philadelphia.

WISCONSIN
CURTISS-WISCONSIN AEROPLANE CO.
FLYING SCHOOL
Milwaukee Air Port
GILLES E. MEISENHEIMER
330 Clinton Street Milwaukee, Wis.

If you are one of the companies in your state having first class facilities for passenger carrying, pilots' training and special flights, you should be represented in WHERE TO FLY each week.

26 Consecutive Insertions $20.00

New York Tribune

First to Last—the Truth: News, Editorials—Advertisements

Member of the Audit Bureau of Circulations.

WEDNESDAY, NOVEMBER 23, 1921

Owned by New York Tribune Inc., a New York Corporation. Published daily, Ogden Reid, President; G. Vernor Rogers, Vice-President; Helen Rogers Reid, Secretary; R. E. Maxfield, Treasurer. Address, Tribune Building, 154 Nassau Street, New York. Telephone, Beekman 3000.

SUBSCRIPTION RATES — By mail, including Postage. IN THE UNITED STATES:

	One Year	Six Months	One Month
By Mail, Postpaid.			
Daily and Sunday	$12.00	$6.00	$1.00
One week, 30c.			
Daily only	10.00	5.00	.85
One week, 25c.			
Sunday only	4.00	2.25	.40
Sunday only, Canada	6.00	3.25	.55
FOREIGN RATES			
Daily and Sunday	$26.00	$13.30	$2.45
Daily only	17.40	8.70	1.45
Sunday only	9.75	5.12	.85

Entered at the Postoffice at New York as Second Class Mail Matter.

GUARANTY

You can purchase merchandise advertised in THE TRIBUNE with absolute safety—for if dissatisfaction results in any case THE TRIBUNE guarantees to pay your money back upon request. No red tape. No quibbling. We make good promptly if the advertiser does not.

MEMBER OF THE ASSOCIATED PRESS

The Associated Press is exclusively entitled to the use for republication of all news dispatches credited to it or not otherwise credited in this paper, and also the local news published herein.

All rights of republication of special matter herein also are reserved.

Until now he was lacking. By this time the good Uncle Sam has so many fleas in his fur that he is in danger of being eaten alive."

Such utterances, there is reason to believe, are approved by only a small fraction of the men and women of German birth or extraction in this country. They come from an insignificant minority of stupid "die hards" or from professional hyphenates financially interested in keeping hatreds and animosities alive.

But inevitably their words are quoted and accepted as [illegible] of the opinion [illegible] who thus become victims of prejudices. Why do they [illegible] fail to suppress their [illegible] malignant traducers. Obviously such publications as the [illegible] Presse," with their coarse and vulgar abuse [illegible] foes to all [illegible] German names.

The Root Program

The Root proposals for the protection of China, accepted by the conference, reaffirm the essentials of this country's Chinese policy. The United States has never sought tan-

COMMERCIAL AVIATION PROVEN

We of the AEROMARINE organization are proud of the fact that the pioneer effort put forth during the past year in flying boat transportation has caused this authoritative editorial statement to be published in one of the leading Metropolitan daily newspapers.

Aeromarine Flying Boats are demonstrating daily the *safety* and profit of flying boat transportation—The Aeromarine Navy Flying Boats are the only type used by Aeromarine Airways. We have a limited number for sale and are accepting orders for spring delivery.

Write for catalog and dealers proposition.

Aeromarine
Reg. U. S. Pat. Off.

Engineering & Sales Co.

Times Building New York

"BE SURE IT'S AN AEROMARINE"

ises well for the youth of the city. The admirable record of the K. of C. chapter at home and with the A. E. F. is an earnest of success. The project calls for $2,000,000, of which $[illegible],000 has already been pledged by the Knights themselves.

America's Commercial Aviation

The first annual report on commercial aviation, just made public by the Navy Department, while covering only the operations of one company clearly shows that commercial aerial transport in this country does not suffer by comparison with the activities of European air lines. In fact, it shows that in the matter of safety America leads Europe.

Americans returning from Europe have brought glowing reports concerning air travel there, and the cables have been kept busy transmitting detailed descriptions of the services maintained on the Continent, all to the apparent detriment of American endeavor. In fact, it has been broadly intimated that commercial aviation here had been sadly and reverently laid in a premature grave.

Now we find in the report received by Rear Admiral Moffett, head of the new bureau of aeronautics of the Navy Department, that American civil air transport, far from being extinct, has established a record for itself which even the brilliant performances of European air lines cannot equal.

The first company reporting to the Navy Department is the Aeromarine Airways, and the report shows that during the last year no fewer than 6,814 passengers were carried a distance of 95,020 miles without a single accident or mishap. In addition to this the flying boats operated by this service transported 29,002 pounds of mail and freight.

Included in these operations is the remarkable 'cross-country flight of the Santa Maria, one of the big United States Navy air cruisers converted into an eleven-passenger cabin airplane. This flying boat made a complete circumnavigation of the eastern half of the United States. Starting from Key West, Fla., it flew up the Atlantic seaboard to this city, and then began a 'cross-country flight over the inland waterways, along the Hudson River Valley and Lakes George and Champlain to Montreal, thence over the Great Lakes to Chicago. From the latter city it flew over the Illinois and Mississippi River valleys to New Orleans, a total air distance of seven thousand miles.

If American aerial transport companies can in the coming year maintain this remarkable performance with an equal degree of safety the threatened and feared European commercial air invasion will never materialize.

called Napoleon III [illegible] foist Maximilian, an [illegible] duke, upon the throne America, beware!

It is by the abount over two million Frenc dead now moldering [illegible]ust that Mr. Wells i[illegible] his echoes of Will[illegible] t[illegible] English tongue, [illegible] de[illegible]d German. He [illegible] "A[illegible]Outline of Ingrat[illegible]

A Holiday fo[illegible]

Now that Senator [illegible] Ohio, and Senator K[illegible] have obtained all the [illegible] is to be had out of th[illegible] day resolutions, let [illegible] until the President an[illegible] call upon them for as[illegible] two gentlemen migh[illegible] chosen some other mea[illegible] the folks back home th[illegible] Washington.

Mr. Pomerene and [illegible] the simplest of telepl[illegible] addressed to the Navy[illegible] could have learned that[illegible] necessity for their resol[illegible] tically all of the 192[illegible] appropriation has be[illegible] Work has ceased on sc[illegible] on others it is being c[illegible] reduced pace.

It is to be hoped th[illegible] Affairs Committee will[illegible] lutions die a proper [illegible] death. The committee[illegible] ety might suggest to[illegible] men from Ohio and U[illegible] go on a holiday until t[illegible] has adjourned.

A Tribune R[illegible]

Who Has Always Lik[illegible] and Writes to [illegible]

To the Editor of The Tr[illegible]

Sir: You will probabl[illegible] ter odd, for it is one o[illegible] and yet the writer ho[illegible] more like it are sent to[illegible]

Years ago, it seems, I [illegible] and there learned somet[illegible] gineering, things litera[illegible] things not mentioned in t[illegible] One of these was learni[illegible] appreciate The Tribune. [illegible] began the initiation into[illegible] for me, which continued [illegible] war. We both liked it [illegible] qualities, even though I [illegible] the Hughes-Wilson epis[illegible]

Together we often rea[illegible] both enlisted on reading[illegible] into the big show. I st[illegible] went over, and remaine[illegible] yet in his letters he e[illegible] the pleasure it gave hi[illegible] when he found a Tribune[illegible] wear, but still The Trib[illegible]

To-day, a Philadelphi[illegible] awoke from the sleep of[illegible] read, from force of habi[illegible] newspaper. Rarely have[illegible] thing like it. Devoid of[illegible] news or Le Vrai à la H[illegible] adequately express the[illegible] ure it gave the reader.

The New U. S. Mail Airplane, Model DH-M2; Developed by the Wittemann Aircraft Corp., Teterboro; Hasbrouck Heights; N. J. from the DH-4 Army Observation Airplane

Read what good engineering can accomplish:

"Without any special adjustments to the engine or fairing of the wires, and with a load of 850 lb. of mail, this ship attained a speed of 126 m.p.h. and a climb of 900 ft. per minute at the ground with an absolute ceiling of 19,300 ft. and a service ceiling of 15,000 ft. The distance of take off of this ship with the 850 lb. of load, compared with a regular deHaviland-4 with a 400 lb. load, proved to be practically the same, and the gasoline consumption at cruising speed showed a saving of as high as seven gallons an hour. On a special test flight, this ship carried a sand load of 1100 lb. and handled perfectly.

The original ship No. 250 has flown from New York to Frisco and back and is now in service in the West carrying an 850 lb. load and giving a most favorable account of herself. The Air Mail Service, by the use of this type of ship, is still further increasing its already high standard of efficiency as the new machines are more than doubling the amount of mail carried at the same speed with the same number of ships and pilots, and with an improved gasoline consumption."

Reprinted from AVIATION, Oct. 24, 1921

(Ready For Garage)

The ***New Longren***

—Is scientifically designed for the individual owner. It is simple and sturdy of construction, beautiful and pleasing in appearance, super-efficient performance, low operating cost, folding wings for housing, extremely practical—in fact, the utility airplane for which you've been waiting.

State Distributor's Territories Available

For Further Information Write

The

Longren Aircraft Corp.

Dept. 102

Topeka, Kansas

COX-KLEMIN AIRCRAFT CORPORATION

Consulting, Designing & Constructing Engineers

College Point, L. I., N. Y.

28 minutes from Penn. Station

Telephone Flushing 3682-J

***Planes:* Brand new for immediate delivery**

Standard-Mercedes Motor, 3 seater	**$3500.00**
DH-6 Benz motor, 3 seater .	**2500.00**
Bethlehem Aircraft, 4 seater .	**4000.00**

Spares for Standards & DH-6.

***Motors:* Absolutely Brand new and complete**

Mercedes- 160-190 hp. .	**700.00**
Benz, 150 hp. . . .	**675.00**

Spare parts for Mercedes and Benz.

Consultation Service to Transportation Companies

A comprehensive financial and technical service is offered by an experienced organization.

All inquiries promptly dealt with. Specifications on request

Write in and state your requirements

EDWARD P. WARNER

Consulting Aeronautical Engineer

Mass. Institute of Technology

Cambridge, Mass.

HAMILTON PROPELLERS

HAMILTON AERO MFG. CO.
MILWAUKEE, WIS.

SAFETY FIRST
AIRPLANE CLOTH
Pinked Tape --- All Widths

TESTED AND GUARANTEED
To Grade A Specification 16,004

Immediate Delivery

W. HARRIS THURSTON & CO., INC.
116 Franklin St. New York
Telephone Franklin 1234
Contractors to U. S. Army and Navy

Warwick **NON-TEAR** *Aero-Cloth*

A SAFE CLOTH *for* FLYING

For Particulars Apply to
WELLINGTON SEARS & CO.
66 Worth Street, New York

For Your Flying ←Boats Use

Upward of 5,000 gallons of Jeffery's Patent Waterproof Liquid Glue has been used by the U. S. Navy and War Departments and as much more by the various manufacturers of seaplanes having government contracts.

L. W. Ferdinand & Co.
152 Kneeland Street
Boston, Mass., U. S. A.

FOR SALE

Cellulose Acetate Dope, quality guaranteed, 50 gal. bbls. $1.00 gal. 5 gal. lots $2.00 gal.

MAX TOPPER & ROSENTHAL
E. 11th. AVE. & P. R. R. TRACKS
COLUMBUS, OHIO

Air Distance Recorder

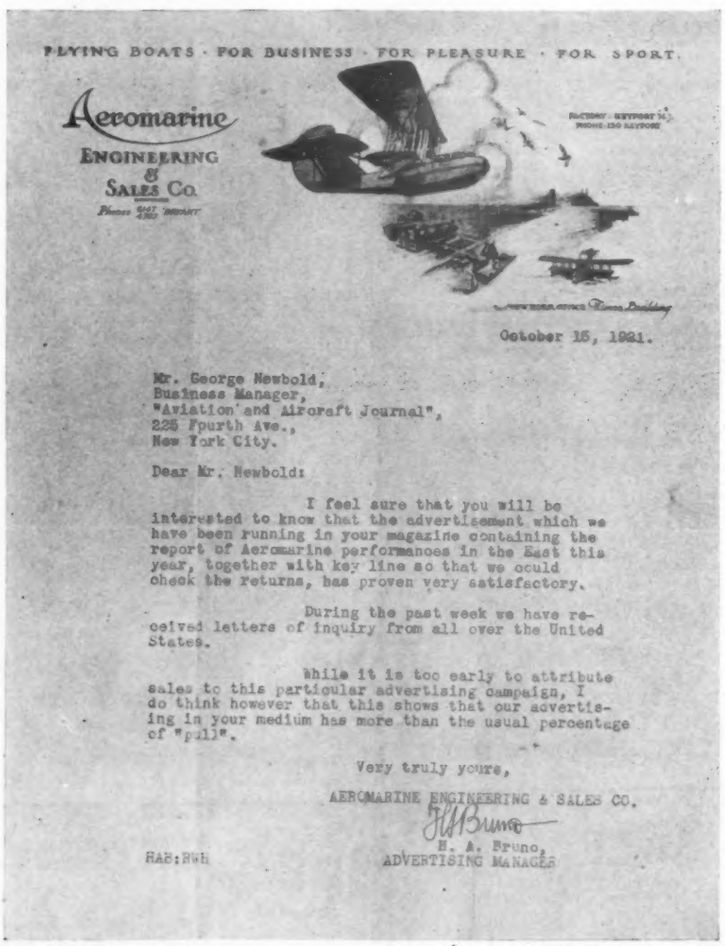
A box containing two Air Distance Recorders, addressed to our Pacific Coast Office, 839 Post Street, San Francisco, has been stolen from our Shipping Department. A reward will be paid for information leading to the recovery of these instruments or to the arrest of any one attempting to dispose of them.

PIONEER INSTRUMENT COMPANY
136 Havemeyer Street Brooklyn N Y

influence, authority, and goodwill!

ADVERTISING is successful in direct proportion to the influence, authority and goodwill of the publication in which it is placed.

Read what the largest flying boat sales and operating organization in the world has to say about a special advertisement which recently appeared exclusively in AVIATION AND AIRCRAFT JOURNAL.



FLYING BOATS · FOR BUSINESS · FOR PLEASURE · FOR SPORT.

Aeromarine
ENGINEERING & SALES Co.

October 15, 1921.

Mr. George Newbold,
Business Manager,
"Aviation and Aircraft Journal",
225 Fourth Ave.,
New York City.

Dear Mr. Newbold:

I feel sure that you will be interested to know that the advertisement which we have been running in your magazine containing the report of Aeromarine performances in the East this year, together with key line so that we could check the returns, has proven very satisfactory.

During the past week we have received letters of inquiry from all over the United States.

While it is too early to attribute sales to this particular advertising campaign, I do think however that this shows that our advertising in your medium has more than the usual percentage of "pull".

Very truly yours,

AEROMARINE ENGINEERING & SALES CO.

H. A. Bruno,
ADVERTISING MANAGER

HAB:RWH

If you wish your advertising to be influential, carry authority and create goodwill, place it in a publication which is recognized for these essential sales qualities.

AVIATION AND AIRCRAFT JOURNAL

225 Fourth Avenue, New York.

INDEX TO ADVERTISERS

A

Aeronarine Engineering & Sales Co..... 693
Aircraft Service Directory..... 698

B

B. G. Corporation, The..... 697

C

Chamberlin, C. D., Aircraft Co..... 697
Cox-Klemin Aircraft Corp..... 694
Curtiss Aeroplane & Motor Corp..... 700

D

Dayton Wright Co..... 674
Diggins, Ralph C., Co., The..... 697

F.

Ferdinand, L. W. & Co..... 695

H

Hamilton Aero Mfg. Co..... 695
Hartshorn, Stewart Co..... 697

L

Longren Aircraft Corp..... 694

M

Martin, The Glenn L., Co..... 676

P

Pioneer Instrument Co..... 695

T

Thomas-Morse Aircraft Corp..... 675
Thurston, W. Harris, & Co., Inc..... 695
Topper, Max, & Rosenthal..... 695

W

Warner, Edward P..... 695
Wellington, Sears & Co..... 695
Where to Fly..... 692
Wittemann Aircraft Corp..... 694
Wright Aeronautical Corp..... 699

CHAMBERLIN AIRCRAFT

CARRY TWICE THE PAY LOAD

3 SEATERS-OX5 OR OXX6 $950. UP.

They climb out of smaller fields with 3 than a regular Jennie with 1, and land 10 to 15 Mi. slower. We can convert your Canuck, JN4D or J-1 from a "White Elephant" into a paying 3 place ship that will have a better climb, higher speed and slower landing.

4 AND 5 SEATERS-$2000. UP.

Fitted with 120-150 HP. FIAT, 150 & 180 Hispano-Suiza 170-215 HP. Isotta-Fraschini, 160 Mercedes, 120 LeRhone or 130 Clerget. See description of 5 place 150 HP. Standard in this issue of AVIATION. New plane and new motor $2850. F.O.B, N, Y:

BRAND NEW MF BOATS

Practically same as SEAGULL

3, 4 AND 5 SEATERS-$2500. UP.

Fitted with FIAT 120-150, Hispano, Isotta & Mercedes.

Note: Stronger wings are fitted to larger models.

Freight carrying planes, 1000 lb. pay load-350 mi. range-$3000 up. These prices are for a limited time in order to get a few ships out so pilots will be familiar with them when they want ships next season. It is also to keep our organization together this winter. Order now and save money.

C. D. CHAMBERLIN AIRCRAFT CO.

3609 Broadway, New York City. Phone Audubon 8804

Factories: Hasbrouck Hts. & Little Ferry, N. J. Field: N. Y. Air Terminal

HARTSHORN STREAMLINE WIRES

Assembled with Hartshorn Universal Strap Ends make the Ideal Aeroplane Tie Rods—diminished wind resistance insuring greater speed.

This fact was proved in the speed test for the Pulitzer Trophy. Four of the first five ships were equipped with Hartshorn Streamline Tie Rods.

Write for circular A-1 describing our Wires and Strap End Fittings.

STEWART HARTSHORN CO.

250 FIFTH AVENUE, NEW YORK

COMMERCE CALLS FOR FLYING IS SPEED THE ANSWER

LEARN TO FLY!

IN CHICAGO WITH

THE RALPH C. DIGGINS CO.

YOU start flying the day you arrive. Competent Instructors. Newest Types of Planes. Gosport System of Instruction.

Thorough Ground Course, including instruction in motors, plane-assembly, wireless, navigation, cross-country flying, field management. Living quarters right here on the field.

PILOTS Receive $5000 Per Year and Up

ENROLL NOW!

Write for literature and enrollment offer.

THE RALPH C. DIGGINS CO.

Dept. 205. 140 N. Dearborn Street Chicago, Ill.

The Spark Plug That Cleans Itself

B. G.

Contractors to the U. S. Army Air Service & the U. S. Navy

THE B. G. CORPORATION

33 GOLD STREET

NEW YORK CITY U. S. A.

The Aircraft Service Directory

WHERE TO PROCURE EQUIPMENT AND SERVICES

SPERRY
AIRPLANE INSTRUMENTS
USED ALL OVER THE WORLD

THE LAWRENCE SPERRY AIRCRAFT CO., INC.
Farmingdale, Long Island, New York
Phone: Farmingdale 133

IMPORTED COMMERCIAL AERIAL CAMERAS
Latest model brand new 7" x 9" GAUMONT CAMERA 20" f/6.3. Krauss Lens, 12 plate automatic magazine, suitable for mapping and obliques 500.00
Extra 12 plate automatic magazines 40.00
5" x 7" GERMAN ICA CAMERA, 12" f/4.5 Voigtlander Heliar Lens including four all aluminum plate magazines 400.00
FAIRCHILD AERIAL CAMERA CORPORATION
136 WEST 52 STREET NEW YORK CITY

CANUCK and OX5 SUPPLIES
COMPLETE ASSORTMENT AT LOWEST PRICES
Recover your Canuck during winter months
1 Set (4) wing covers (cotton) with tape and dope $69.00
2 Upper wing covers (cotton) with tape and dope $45.00
2 Lower wing covers (cotton or linen) with tape and dope $38.00
Single covers Upper $15.00, Lower 14.00
Acetate dope per gal. $1.00
Other material & parts at correspondingly low prices
Aircraft Materials & Equipment Corp., 1409 Sedgwick Ave., N. Y. C.

ACETATE AEROPLANE DOPE
Eastman, Clear Acetate Dope, Code No. 41, in 50 gal.; steel drums; at less than ONE HALF MANUFACTURERS PRICE. This dope is approved by the Engineering Division, Air Service, McCook Field, for use on Gov't., Contracts, and all purchasers of this Dope will be notified by the above Department of this approval.
BRAMER-KELLY-CANFIELD CO.,
134-16th St., BUFFALO, N. Y.

Canuck
WRITE FOR OUR SPECIAL PRICE LIST
CANUCK, JN., AVRO AND OX-5 PARTS
ERICSON AIRCRAFT LIMITED
120 KING ST., EAST, TORONTO, CANADA

CURTISS SHIPS FOR SALE
$500.00 AND UP
CURTISS EASTERN AIRPLANE CORP.
130 S. 15th St. Phila., Pa,

OTTO PRAEGER
Aviation Consultant
5052 Grand Central Terminal Building
New York City

SUPPLIES — "CANUCK" "JN" "OX5"
IMMEDIATE SERVICE
Our large stock is positively the most complete in the States. When you order it from us you get it. No time lost from partial shipment. All materials guaranteed new and unused. Write for special season price list.
AMERICAN AIRCRAFT, INC.
AERODROME LOGAN FIELD, MD. BALTIMORE, MD. *STATION F. BOX 104* STORES DUNDALK, MD.

AIRPLANE ENGINES
LOWEST PRICES
IMMEDIATE DELIVERY
We Specialize on Isotta-Fraschini & Hispano-Suiza
AERO DISTRIBUTING COMPANY
17 East 42nd St., Room 419 New York City

AN AIRPLANE EXPERT KNOWS --
THEORY
MANUFACTURE
MAINTENANCE
DESIGN
AERODYNAMICS
MOTORS
That an expert knowledge and foundation of airplane engineering can be laid only by study under competent guidance.
A preparatory course by mail. Practical work.
FOR FULL DETAILS WRITE
Leslie B. Coombs-Chief Engineer-Central Airplane Works
843 Windsor Ave., Chicago, Ill.

For RELIABLE RESULTS and a SQUARE DEAL.
USE
DOPES CLEAR OR PIGMENTED — **TITANINE** Reg. Trade Mark — VARNISH AND ENAMELS
MADE BY
TITANINE Inc., Union, Union County, N. J.

PATENTS, for sale Patent No. 1,190,248, covering changeable angle of incidence of main planes and automatic lateral and longitudinal stability. Particularly adaptable to thick section wings. Patents No. 1,177,382 and 1,210,418 covering dual controls. $2,000 or reasonable offer.
Write **D. F. CASHMAN**
108 HARTFORD ST., DAYTON, OHIO

AVIATION ADVERTISEMENTS
will help you to make 1922 a better and more prosperous year.

AN OPPORTUNITY TO COMPLETE YOUR FILES
We have a limited supply of bound and unbound volumes, also a few back issues of
AVIATION AND AIRCRAFT JOURNAL
225 FOURTH AVE. NEW YORK CITY
Prices upon request